The Physics of Life

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Abstract

This general-audience book introduces the main ideas of the so-called Platonic theory of spacetime, presented in full at my website, and also rebukes the materialistic speculations by many physicists and philosophers regarding the physics of the brain, along with those based on dualistic parapsychology. To that end, three major issues are explained in details: the common origin of matter and psyche, the Heraclitean arrow of Time, and the self-acting faculty of living organisms and quantum-gravitational systems. Hence the human brain is embedded in the quantum-gravitational Brain of the Universe, and the two are governed by the physics of Life.

The first off question in the book is the following: given the fact that the human brain is equipped with mind, consciousness, volition, and memory (abbreviated MCVM), what could be the physics of this chunk of wet warm matter? The two have nothing in common, yet they are perfectly correlated. The solution is based on the Platonic world and the global Heraclitean Time. It leads to a new pre-geometric theory of spacetime, called Platonic theory of spacetime. The latter is suggested as the only possible conceptual solution to the problems in quantum gravity and quantum cosmology. As a corollary, the possibilities for physical theology and spacetime engineering with MCVM are briefly explored.

The electronic version of the book, in PDF format, is available at my website. Ch. 10 is reserved for the contributions by many physicists and mathematicians, expected by Christmas 2021. The publication date is fixed at January 6, 2022, commemorating my fifty years of research. The second video demonstration of spacetime engineering is due on March 27, 2022, and the third one in 2024.

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Questions and Answers

Q1. Why Platonic world and Heraclitean Time?

A1. The Platonic world (Res potentia) is explained in Ch. 2, pp. 3-6. It (not “He”) is the common source of matter and psyche, after Leibniz9,16. To recover the global unobservable Heraclitean arrow of Time (p. 3), I use reverse engineering and interpret (i) the intact, not-yet-observed quantum state in QM (Erwin Schrödinger in Ch. 2) and the negative energy densities in QFT40,43, and (ii) the “intangible”34 gravitational energy32,54 capable of producing Earth tides33 (p. 18), as Platonic world (Res potentia) placed in the potential future of the arrow of Time (Fig. 4). Thus, (i) and (ii) do not belong to the past57, but to the potential future depicted with the carrot (see p. iii) in the first video demonstration from 15 January 2020, entitled Spacetime Engineering 101. The second (advanced) video demonstration, Spacetime Engineering 20153, is due on 27 March 2022. It is a very simple exercise: see Fig. 6 at p. 6 and read about the so-called biocausality (January 1990) at p. 13. The immediate application of spacetime engineering is natural healing, known as Reiki. It is made of two Japanese words — Rei which means “Higher Power” and Ki which is “life force”. Replace Rei with the Platonic Universe as ONE (p. 5), and Ki with its physicalized mass-energy57, as explained with a sequence of apples. I hope to elaborate in the third video presentation Spacetime Engineering 301 in 2024. It will be even more ‘advanced’, as Reiki is based on physical theology (Ch. 6.4).

But why is the Heraclitean arrow of Time unobservable? Any physical observation will inevitably use light and hence can show only in the past57 (Fig. 4, p. 3), which is why I used reverse engineering to uncover the physicalized imprints of the arrow of Time, cast in the past57. Physically, the Platonic world (Res potentia), placed in the potential future of the arrow of Time, is ‘nothing’ (Ch. 6 and p. 3 in Time.pdf). We observe, in our physical and mental worlds, only two complementary ‘shadows’ (Fig. 12 at p. 13), called matter and psyche (the doctrine of trialism, Fig. 5).

Now, as I stated earlier, this book introduces the main ideas of Platonic theory of spacetime, presented in full at my website (p. i). I do not touch the gravitational rotation, because the issue is too difficult for the general audience, and also because I have explained it elsewhere. In the Gravitationsfeldrelativitätstheorie (Gravitational Theory of Relativity), spacetime guides matter, telling it how to move-and-rotate. At the same instant, matter acts back on spacetime, telling it how to alter the rate of Time in the invariant spacetime interval $\Delta s^2$. In general, (i) the action of gravity, thanks to which matter has inertia (Fig. 9b, Ch. 3), and (ii) the ubiquitous gravitational rotation are like two sides of a coin. An apple can fall from a tree and hit your head because they both experience gravitational rotation. Everything rotates, from quantum “particles” endowed with quantum spin to planets, galaxies and beyond. In current GR textbooks, the alleged spacetime “curvature” cannot in principle explain the gravitational rotation and Earth tides33.

How can the spacetime metric rotate the Earth and pull up rocks? Can the experts explain the first off puzzle — the energy32 from gravity35 (H. Ohanian)? Read p. 18. We cannot make any progress today, because physics is vehemently contaminated with GW parapsychology50. Physicists are scared to even think about gravity. Sorry.

I thank Stavros (Kavala, Greece) for his question. Do not hesitate to send yours.

June 23, 2021, 11:35 GMT
Q2. Sorry, I did not understand your explanation (A1). Can you make it simpler?

A2. Let me try. The global Heraclitean Time is the ‘vehicle’ explained in the first video demonstration from 15 January 2020, entitled *Spacetime Engineering 101*. Please see Fig. 6 at p. 6, reproduced below.

You only have to swing the “carrot” (*potential future*) toward your desired destination, and the donkey will carry you and your 4D “cart” there. The principal question is how to develop feedback from the *matrix* shown as “carrot”: follow the Law of Reversed Effort. There is no *physical* interaction between you and the *wegtransformierbar* matrix — you will only notice that your ability to perform *self-action* (p. 10) has been increased.

To understand the Platonic *Res potentia*, read the explanation of the “trunk” in Fig. 5 at p. 3. Bottom line is the mater-psyche duality and the doctrine of *trialism* (pp. 2-3). Did you get it, my dear Eskimo?

Back to the “carrot” above: we all practice a ‘mild’ spacetime engineering. Read N.A. Bernshtein at p. 13. Once you include a distant physical system in your perceptual space and body schema, you will obtain a new sensation from the *qualia* of your new “carrot”, and you’re ready to go (p. 14). But how? I suggested (21.09.2008) two types of distances in 4+0 D spacetime: (i) metric distance (local mode of spacetime), and (ii) a *pregeometric* Platonic “distance” (global mode of spacetime). The latter is *exactly zero*: see the *atemporal* strips in the movie reel in Fig. 11. Now you say, ‘naah, there’s no such animal!’ But what is the “distance” between the cognitive concepts in your memory, say, between the notion of a tree and that of a mountain? Ditto to the “distance” between electron orbits (Slide 9). They are “just in the middle between possibility and reality” (Werner Heisenberg).

To practice spacetime engineering, you only have to follow the Law of Reversed Effort: “To the mind that is still, the whole universe surrenders” (Lao Tzu). Read *Notes on Spacetime Engineering (SE.pdf)*. Here is a simple example of how the human brain works ‘as a whole’:

Aoccdrnig to a rscheearch at Cmabrigde Unievrtisy, it deosn’t mtttaer in whah ordehr the lttehrs in a wrod are, the olny iprmoeht ihng is taht the frist and lsat ltteer be at the rghit pclae. Ths set can be a total mses and you can stll raed it wouthot a porbelm. Ths is bcuseae the huamn mnid deos not raed ervey ltteer by istlef, but the wrod as a wlohe. Pritie amzaning huh?

Your brain works *upon itself, by itself*. This is the physical *mediator* of the mind, consciousness, volition, and memory (abbreviated MCVM): read p. 2. The same type of *self-action* runs *gravity* and the physics of Life. Metaphorically, think of Platonic *hand* in a physical glove — all biological and quantum-gravitational systems become *self-acting* ‘gloves’ and hence can perform work *upon themselves, by themselves*. In the example above, your MCVM springs from the Platonic *hand*. Simple, isn’t it?
Q3. You are denouncing Einstein’s GR, but what is your theory of gravity?

A3. As I tried to explain in my contribution to the physics of Life (p. 28), the *global* phenomenon, creating the Large and the Small (Fig. 13), will create gravity *locally*, by “shrinking” the metric to produce local gravitational attraction, and at the same instant by “inflating” the metric in the remaining part of the system to produce local gravitational repulsion, so that the two tug-of-war manifestations of gravity reach *dynamic equilibrium*. It is a *balance* (Eq. 2 at p. 28). Not “conservation”.

Bottom line is the Heraclitean arrow of Time: read *Notes on Spacetime Engineering (SE.pdf)*. To quote from W.G. Unruh in ref. [13] therein: “Gravity is the unequable flow of time from place to place. (…) The phenomena we usually ascribe to gravity are actually caused by time’s flowing unequally from place to place.” But to grasp the *flow* of Time and explain the flexible and unequable *rate* of Time will require considerable efforts. We can’t define the *rate* of Time as ‘one sec per sec’. Here’s a simple illustration of the *flexible* unequable rate of Time.

Imagine three *invariant timelike intervals*, called Alice (A), Bob (B), and Carol (C). Here A = ½ B, and B = ½ C. If we tweak the coefficient, A can shrink to the size of *protons*, whereas C can be inflated to the size of *galaxy clusters* and more.

A __________ B ____________________ C ________________________________________

Now, suppose the *assembling* of spacetime (Fig. 14) creates A, B, and C above. As E.F. Taylor and J.A. Wheeler explained, A, B, and C “are calibrated in meters of light-travel time”, so 1m is app. 3.3 nanoseconds. In the relative-scale spacetime (Fig. 13), the *re*-assembling of spacetime (Fig. 14) is a new *relational* phenomenon, meaning that the *rate* (Sic!) of the light-travel Time is both relational and *flexible*. With respect to Bob (B) at macroscopic length scale, Alice (A) is “small” and Carol (C) is “large”, and Bob will speculate that Carol was “inflated” by “dark energy”. But if Nature tweaks the relational *rate* (“speed”) of the light-travel Time, Alice will be assembled with half the *rate* of the light-travel Time that assembles Bob, and Carol will be assembled with the double *rate* of Bob’s light-travel Time. Only the *rate* (“speed”) of light-travel Time is different, like trespassing a distance of 1m, but with different *rate*. So, Alice, Bob, and Carol always have *identical* relative-scale (RS) “sizes” of 1m in *their* (Sic!) reference frames. Relative to Bob’s reference frame, Alice will be “small” and Carol will be “large”: 3.3 nanoseconds of light-travel Time with *assemble* their 1m with different speed/rate. Nothing in Nature is absolutely “large” or “small”. All is relative, as uncle Albert used to say. Thus, if we apply this global phenomenon locally at B above, we will experience the attracting effect of gravity, creating *locally-deflated* area of spacetime viz. the attracting gravitational “force” producing, say, the *Earth tides*. Where does the energy of the ‘glove’ come from? See the so-called *evolution equation* at p. 28.

Q4. Why are you banging your head against a wall?

A4. Climate change – check out the Rossby Waves at YouTube (1:48/4:26). We do need unlimited clean energy, and *spacetime engineering* may be *the only* chance we have to reduce CO₂ emissions by 7.6 per cent every year from 2020 to 2030. If we fail *now*, by 2025 (Sic!) the cut needed will steepen to 15.5 per cent each year, which is absurd, plain and simple. Read p. 28 (last) in *BCCP*. *Time is running out!*
1. Introduction

The author of this book firmly rejects the speculations by many theoretical physicists and philosophers about the human brain, mind, and consciousness (Ch. 6). You will be the judge.

Given the fact that the human brain is equipped with mind, consciousness, volition, and memory (hereafter abbreviated MCVM), what could be the physics of this chunk of wet warm matter (Fig. 1)? How is our MCVM connected to its brain? The two have nothing in common!

The easiest approach toward this puzzle is to postulate that MCVM is epiphenomenon: the brain is the “hardware” and MCVM is its “software”, so everything we study in psychology is a totally redundant mental reflection (qualia) of neural computations (Fig. 2) in the “hardware” (Fig. 1). For example, it is claim that “an adult human brain carries out about one thousand trillion ($10^{15}$) logical operations per second” (H. Greenside). But these $10^{15}$ logical operations per second are reserved only for the first homunculus; the second one will control the first homunculus, the third one will control the second homunculus, ad infinitum (Fig. 2). Why? Because no computing machine, called homunculus, can act on itself, like Baron Munchausen.

How can we square the circle? Perhaps with some help from Quantum Mechanics (H.P. Stapp; S. Hameroff) or from gravity (R. Penrose)? Or maybe both? Let’s face the bold facts about the human brain. We need new physics, which I will call ‘the physics of Life’. First, some history.
In February 1943, Erwin Schrödinger stressed that “we are here obviously faced with events whose regular and lawful unfolding is guided by a ‘mechanism’ entirely different from the ‘probability mechanism’ of physics. (...) We must be prepared to find a new type of physical law. Or are we to term it a non-physical, not to say a super-physical, law?”

Erwin Schrödinger was right, but his colleagues did not search for a new type of physical law. Look at your prenatal brain (Fig. 3): it will soon grow with the rate of about 250,000 nerve cells per minute or roughly 4000 per second, so that now you can think. How come nothing goes wrong? Why is Murphy’s law ‘anything that can go wrong will go wrong’ not valid here?

Fig. 3. Compare it to Slide 10 in Quantum Spacetime.

Our goal is to focus on the physics of Life. We will ignore all materialistic and dualistic ideas and will formulate the simplest possible task: what is the physical mediator of MCVM in the human brain? On the one hand, this ‘mediator’ (sit venia verbo) can interact with the human brain and the physical world, and therefore it must be physical stuff (called ‘causal field’, Ch. 4). On the other hand, the same ‘mediator’ has a special dual nature, in the sense that it has qualia manifested in our MCVM. Hence it is neither physical nor mental entity. It is the Platonic world (Fig. 5) casting two complementary “shadows”, called matter and psyche.

Bottom line is the oldest proposition about matter and psyche as two pre-correlated entities, which emerge from their common source (the doctrine of trialism, Ch. 2). Compared to the wave-particle duality in quantum mechanics, our theory also suggests two complementary presentations emanating from their common source (“trunk”, Ch. 2), but in our case the “wave” has particular qualia placed in the potential future (“carrot”, Ch. 2) in the Heraclitean arrow of Time (Ch. 3), thanks to which it can act as ‘mediator’ of the human mind and also deliver the physics of Life (Ch. 4), bootstrapping and guiding the living brain (Fig. 3).

Needless to say, the metaphysical framework was worked out by Gottfried Wilhelm Leibniz. We will try to cast it in the framework of modern theoretical physics and cosmology. At the end of the day, we will suggest that the physical partition of the Universe is designed like the human brain, thereby suggesting the idea of quantum-gravitational Brain of the Universe viz. a set of faculties of the human brain embedded in the Universal Brain due to their common spacetime. Physically, the Platonic world is always exactly nullified (4+0-D spacetime), and is therefore unobservable with light. Physically, it is a ‘vacuum’. In the doctrine of trialism (Ch. 2), we expect to encounter the complementary UNspeakable cognitive vacuum, as matter and psyche are interpreted as two complementary “shadows” of the Platonic world.
Let me show how all pieces of the Platonic spacetime (Fig. 10) can find their unique places and fit there effortlessly, like the pieces of the jigsaw puzzle of Nature.

2. The physics of Life

Matter and psyche must be separated\(^{12}\), to preserve their ontologically different nature. But they also must be connected, in order to interact and evolve. The only possible way to fulfill these requirements is to place matter and fields in the irreversible past, and the psyche in the potential future in the Heraclitean arrow of Time (Ch. 3). Obviously, we need new physics\(^{1}\), as Erwin Schrödinger argued in February 1943\(^{5}\). Physicists can no longer pretend that the Platonic world were “outside” their field of research, hence it might be of interest only to philosophers and priests. Quite the contrary. The task is strictly mathematical, and it requires rigorous investigation of the structure, topology, and dynamics of spacetime\(^{1}\) (Fig. 4); details in Ch. 4.

Fig. 4. Explanation in Fig. 11 and in Quantum of Spacetime\(^{1}\).

Let me introduce the doctrine of trialism (Fig. 5); see Slide 14 in Quantum Spacetime\(^{14}\).

Fig. 5

To explain Res potentia and the doctrine of trialism, imagine the following situation: you are an Eskimo, and you have never seen and will never see an elephant in your life. Yet you can make observations on elephant’s trunk by two complementary devices measuring either properties of your arm or properties of your nose.

You can never imagine the common source of your arm (Res cogitans) and of your nose (Res extensa), which you blindly called trunk (Res potentia), because the latter does not have any arm-like “windows” nor nose-like “windows”: it (not He) is ‘the true monad without windows’. (Leibniz Monadology § 7)

You may suggest, after Leibniz, that what you see as an arm (Res cogitans) is always pre-correlated with what you see as a nose (Res extensa) by pre-established harmony. But again, you’re an Eskimo and cannot even imagine the ‘trunk’ (Res potentia).
Notice § 7 in Leibniz’s *Monadology* from 1714: “The monads have no windows through which something can enter or leave.” There is no mathematical presentation of such unique object, because the monad is *not* the mundane ‘empty set’. The latter denotes the absence of some cognizable object, like ‘zero something’; for example, I suppose the set of bananas, which you have stuck in your ears while reading these lines, is most likely an empty set. The monad, on the other hand, has no ‘windows’ whatsoever (Fig. 5), hence the probability for its observation is exactly zero. It (not “He”) cannot be grasped even with thought experiment, as it resembles Kant’s Noumenon (*Das Ding an sich*) thus, the monad might be both ‘one’ and ‘many’. It is the source of both matter and psyche – the Platonic world as Reichenbach’s Common Cause.

The metaphysics of the doctrine of *trialism* (Fig. 5) is heavier than the wave-particle duality in Quantum Mechanics (QM). The latter presupposes an object — the *intact* quantum state — which cannot be directly observed, yet it plays the role of Reichenbach’s Common Cause to all quantum “particles-and-waves” viewed as its *physicalized* “jackets” (p. 17). For example, in the Schrödinger’s cat paradox, there are two *physicalizable* states of the *intact* quantum cat, either “alive” or “dead”, yet QM textbooks cannot describe the *intact* quantum cat from which they would evolve. As Erwin Schrödinger stressed in 1935:

The rejection of realism has logical consequences. In general, a variable *has* no definite value before I measure it; then measuring it does *not* mean ascertaining the value that it *has*. But then what does it mean?

It means that the probability for observing the *intact* quantum state — the quantum monad — is exactly zero. Now, in the doctrine of *trialism* (Fig. 5), the Platonic world is explicated as (i) Res extensa (matter and fields) in the irreversible past (Fig. 4), (ii) Platonic Res potentia in the potential future (Fig. 4), and (iii) Res cogitans (psyche) placed also in the potential future. Thus, the Platonic world is the ultimate ‘monad without windows’, and the Res potentia (ii) pertains to both the living world, such as the human brain, and the quantum-gravitational world (Ch. 4). Metaphorically, Res potentia (ii) acts like a “filter” for Res cogitans (psyche) in the macroscopic world, thanks to which the psyche is exclusively explicated there. Both the quantum and gravitational systems have their specific Res potentia (Ch. 3), but they are *not* endowed with human mind, because the latter can be coupled only to macroscopic systems. Thus, the question of whether the Universal Brain (Ch. 1) may or may not be equipped with some kind of Universal Mind (intelligenten Geist) is outside the applicable limits of the theory.

For example, let me quote Max Planck from his last speech *Das Wesen der Materie*:

> There is no matter as such! All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds this most minute solar system of the atom together. We must assume behind this force the existence of a conscious and intelligent Geist (bewußen intelligenten Geist). This Geist is the matrix of all matter.

Replace ‘the matrix of all matter’ with Res potentia (Fig. 5) — it is neither matter nor psyche. And yes, the matrix or Res potentia (p. 19 in *Quantum of Spacetime*) is present everywhere in the quantum-gravitational world, and in the chunk of wet matter above your neck (Fig. 3).
Let me go back to Fig. 4 and explain how Res potentia — the matrix of all matter — acts as a “mediator” of mind, consciousness, volition, and memory\(^1\) (MCVM) in the human brain (Ch. 1).

Notice that Fig. 4 (called ‘atom of geometry’\(^1\)) shows only the left (vertical) section of Fig. 5. Secondly, notice your belief that your ‘nose’ (Res extensa) might have some ‘nose-like’ presentation in the ‘trunk’ (Res potentia), called in physics ‘vacuum’\(^13\). True or false? JAIN (yes and no). The same tallies to your stipulation that your ‘arm’ (Res cogitans) might have some ‘arm-like’ presentation in the ‘trunk’ (Res potentia): JAIN. This is the lesson from the absence of windows\(^16\) toward the trunk (Res potentia). And thirdly, notice that the doctrine of trialism — one monad explicated by its two complementary emanations — is much simpler in QM, compared to the entire Platonic world. In the former case, the quantum monad (Erwin Schrödinger in 1935), placed in the potential future (Fig. 4), is casting two complementary “shadows” in the physical (Sic!) world, either a ‘particle’ or a ‘wave’. In the latter case, we face the ultimate Platonic monad (Res potentia) placed in the potential future (Fig. 5) and casting the two complementary “shadows” of Nature — matter (Res extensa) placed in the irreversible past, and psyche (the noetic world or Res cogitans) in the potential future.

We have two complementary (not alternative) paths toward understanding Mother Nature: from the material world (Res extensa), she will look to us like ‘the entire Universe as ONE’, and if viewed from the noetic world (Res cogitans) she will look to us like God in the Gospel. Yet Nature is both ‘the Universe as ONE’ and God (John 1:1), and we will use the two images in the same way we use the two complementary notions of ‘particle’ and ‘wave’ in QM\(^8\). But how can the ‘arm’ (psyche) interact with the ‘nose’\(^11\) (matter) via their common ‘trunk’?

Let’s make an experiment with our non-verbal processing of mental images, borrowed from Allan Paivio\(^23\). Imagine two digital clocks, A and B. Clock A shows 10:45 and Clock B shows 13:25. Convert them to analog clocks, and “look” closely at their mental images: which angle between the short hand and the long one is greater? In Clock A or in Clock B? To deliver the answer, your brain\(^11\) must do work. Not your mind or consciousness. Your brain does the job. Only matter can interact with matter. Your psyche (dubbed ‘arm’) only alters the future state of your brain (‘nose’) via their common ‘trunk’ (Res potentia), hence the brain interacts with itself. Not with its mind or consciousness. We face here two parallel words running both in the left (vertical) section and in the upper (horizontal) section of Fig. 5, and these totally different worlds\(^15\) are both separated and united (Ch. 2) by the Heraclitean arrow of Time (Ch. 3).

Again, the self-acting faculty of the brain is the crux of the physics of Life. Otherwise the brain will have to be controlled by some anatomically-privileged system (called here ‘homunculus’, Fig. 2), which of course does not exist. If people use the language of theoretical physics and stick to their materialistic religion, they would call such homunculus “dark”\(^24\). (Later in Ch. 3, I will replace the materialistic hogwash about some “mystery matter” with the self-action of the entire Universe, in line with the idea of Universal Brain.) To make the presentation of the theory a bit less complicated, I will stress that the physics of Life is not particularly concerned with the human mind, consciousness, volition, and memory\(^15\) (abbreviated MCVM) viz. with the mental images from the clocks in the experiment above, but with the physics implied in Fig. 4 and in the left (vertical) section of Fig. 5. To that end, let me quote from p. 20 in Quantum of Spacetime\(^1\) (Fig. 6):
You only have to swing the “carrot” (potential future) toward your desired destination, and the donkey will carry you and your 4D “cart” there. The principal question is how to develop feedback from the matrix shown as “carrot”: follow the Law of Reversed Effort. There is no physical interaction between you and the wegtransformierbar matrix (p. 19) — you will notice that your ability to perform self-action (p. 24) has increased. But it is not like Baron Munchausen. Newton’s 3rd law is not valid.

Just like the brain, the donkey has an additional input of energy from its potential future in Fig. 4, thanks to which it can act on itself. Pity many people would call this additional energy “dark”. Read about the Platonic “hand” in a 4D “glove” at p. 5 in Quantum of Spacetime.

To complete this brief overview of the physics of Life, let me explain the “carrot” in Fig. 6, placed exclusively in the potential future in Fig. 4: it contains the not-yet-physicalized states of the donkey and its cart, bundled with all not-yet-physicalized states of the potential roads ahead. The “road” is not fixed on the ground, and neither is the “carrot”. The two are being re-created ‘on the go’, and in this sense they are an inherently flexible potential reality (Res potentia) — just in the middle between possibility and reality. The biological entanglement of all not-yet-physicalized states, called here matrix, is the hallmark of the physics of Life. Otherwise you will have to choose from “neural computing” (Fig. 2) or supernatural “ghosts.”

In the next chapter, I will list all major assumptions made so far, and will show how they can fit effortlessly in modern theoretical physics. I will start with the fundamental flow of events, called Time. It is manifestly present in Nature (Slide 1 and Slide 2), but not in the physics textbooks. Why not? Because the Heraclitean Time cannot by driven by any physical stuff. If it were, the Heraclitean Time (Fig. 4) will be exposed to physical observations, which will kill the Theory of Relativity by pinpointing an absolute reference frame and absolute physical time. I will argue that the Heraclitean Time can be driven only by the Aristotelian Unmoved Mover endowed with self-action. Hence Time is perfectly hidden by the “speed” of light.

Needless to say, there is no consensus on the issues raised in this book. It’s a total mess.

Follow the facts, cut the “dark” crap, and take my opinion with a grain of salt. The only reason for writing these lines is that the theory has been experimentally confirmed, many times indeed. Yes, spacetime engineering (Fig. 6) works, better than a Swiss watch.

3. The arrow of Time

Time is indissolubly linked to energy. Every physical process uses energy and evolves in time; for example, a detonating cord (Fig. 8). Let me first choose a clock related to what is labeled in physics textbooks with ‘time as read with a clock’: the “expansion” of space (Fig. 7). Later I will come back to its “fuel” and will suggest, faute de mieux, the so-called negative mass.
To quote Davide Castelvecchi\textsuperscript{31}: “American astronomer \textbf{Edwin Hubble} (...) discovered in the 1920s that the Universe is expanding by showing that most galaxies are receding from the Milky Way — and the farther away they are, the faster (Sic! - D.C.) they are receding. The roughly constant ratio between speed and distance became known as the Hubble constant. For each additional megaparsec (around 3.26 million light years) of distance, Hubble found that galaxies receded 500 kilometres per second \textit{faster} (emphasis mine - D.C.) — so the Hubble constant was 500 in units of kilometres per second per megaparsec.”

I will use the “expansion” of space as a clock. Consider three instants ‘here and now’ along the cosmological time, \( t_1 < t_2 < t_3 \) (Fig. 7).

\begin{center}
\includegraphics[width=0.5\textwidth]{Fig_7}
\end{center}

What kind of energy could be spread across the entire “ballooning” universe? It cannot be any localizable physical energy of some \textit{physical} field, like a burning detonating cord (Fig. 8).

\begin{center}
\includegraphics[width=0.5\textwidth]{Fig_8}
\end{center}

As Zhao-Yan Wu\textsuperscript{32} explained, “there is no spring or sink everywhere in spacetime for matter energy-momentum, therefore gravitational field does not exchange energy-momentum with both electromagnetic field and particles (charged and uncharged). Hence it does not carry energy-momentum. Gravitational field is not a force field, and gravity is not a natural force.”

\textbf{NB}: Here is the crux of the problem of the energy \textit{from} gravity. Suppose you are looking at a mountain. It has a shape, which is sheer geometry. And the mountain is the “source” of its shape. How can the shape itself act back on its mountain? It does not have any mountain-like features, namely, gravity is not some \textit{physical} field. It is “not a natural force,” as Zhao-Yan Wu\textsuperscript{32} put it. Nobody can question the bold fact that gravity can perform work, for example, in producing Earth tides\textsuperscript{33}. Nobody would suggest that a purely mathematical object, such as Christoffel symbols (J. Bloomfield), can pull up the body of the Earth\textsuperscript{33}. Very tough problem.
The only possible solution to the origin of gravitational energy requires new physics. Recall that we have the same problem with the action of the human mind on its brain, and have suggested a new ‘mediator’ called Res potentia (Fig. 5), which would look like a vacuum. To use the metaphor of Platonic “hand” in a 4D “glove” (p. 5 in *Quantum of Spacetime*), I suppose the former is Res potentia (Fig. 5), related to the so-called negative mass. The physical “glove” will experience an influx of positive energy density: only matter interacts with matter. Hence the total energy of the gravitating system will be flexible, meaning the total energy will fluctuate due to the non-conservation of energy viz. the influx of physicalized “intangible energy”. We will need quantum gravity to describe quantitatively the influx of mass-energy into the 4D “glove”, leading to its self-action (Ch. 2). Surely it is not “magic” — any sufficiently advanced technology is indistinguishable from magic (Clarke’s Third Law).

The point I wish to make here is that the physical time, as read with a clock (Fig. 7), does not require conservation of energy. The physical partition of the Universe, called “glove”, is like the prenatal brain (Fig. 3) governed by its biological matrix (Fig. 6) and Res potentia (Fig. 5).

But does the physical time, as read with a clock, require the global Heraclitean arrow of Time? Absolutely. The arrow of Time never stops, even if we are at rest and do not “consume” 3D space. Only this “arrow” does not have direction in 3D space (Slide 2). It is omnidirectional.

Look at the car in Fig. 9a below: it is at rest (Wikipedia), yet its physical time does not stop. Physicists claim that the car is “propelling” with the “speed” of light, but cannot show its direction. We face exactly the same puzzle in the direction of the universal ‘pull up’ of the elevator in the famous thought experiment by Albert Einstein in 1907, depicted in Fig. 9b.

The “direction” of the universal propagation of light is non-relational, because it is impossible to show any direction in 4D spacetime, in which light is not propagating. It is omnidirectional. The hypothetical Ether, in which light would propagate, is not physically detectable, as proved by the negative result from the Michelson–Morley experiment. Physically, the Ether is squeezed to zero, matching the “size” of every 4D spacetime point of joint emission-and-absorption of photons. Physically, we can observe only the irreversible past — only once at a time.

On the other hand, the physical time ‘as read with a clock’ has no direction whatsoever. It is squared, along with 3D space, in the invariant spacetime interval. In GR textbooks, moving
along \( +t \) and back along \(-t\) is like moving from the left to the right and back. Physicists claim that the unquestionable difference between the past and the future is caused chiefly by the second law of thermodynamics, which is tantamount to saying that I am getting old \( \text{because} \) my hair is ‘more salt than pepper’. Why put the cart before the horse? I can understand why physicists\(^2\) may feel uncomfortable with the unobservable, due to the ‘speed’ of light\(^1\), Heraclitean arrow of Time\(^4\), but the only alternative will be invoke some new physical stuff (Fig. 8) creating the physical time, then suggest yet another physical phenomenon acting as its source, etc., \( \text{ad infinitum} \) (Fig. 2). Bad idea. Aristotle suggested the solution many centuries ago: the Unmoved Mover\(^2\) endowed with self-action. There is no need for any “dark energy”\(^2\) (Ch. 2). Are the Earth tides\(^3\) caused by “dark energy”? How can geometry produce work?

Our theory fits perfectly in QM, because the \( \text{intact} \) quantum state — the quantum monad — is \( \text{not} \) included in the quantum wave function: read Erwin Schrödinger in Ch. 2. Physically, the quantum monad is always nullified, because it belongs to the Platonic realm of \( \text{Res potentia} \) (Fig. 5). In Quantum Field Theory\(^4\) (QFT), we talk about quantum vacuum\(^1\), which it is \( \text{not} \) directly observable either. We can only detect its “jackets”\(^1\). The “Higgs field” is unphysical.

Can we work out a new theory of quantum gravity, based on the ‘common denominator’ of gravity and the quantum world\(^4\), called \( \text{Res potentia} \) and placed in the \( \text{potential} \) future of the arrow of Time (Fig. 4)? First, we need new numbers, called hyperimaginary numbers (p. 10).

4. Quantum gravity

Let me introduce the geometric model of Platonic spacetime containing a new degree of freedom depicted with the axis \( W \) in Fig. 10\(^3\). It is \( \text{exactly} \) nullified in the physical world, leading to a \( 4+0 \)-D spacetime — the Platonic world lives “within” the null interval along \( W \).

![Diagram](Fig. 10. See Fig. 11, Fig. 12, and read p. 15 in Quantum of Spacetime\(^1\).)

Quote from Wikipedia\(^4\): “Spacetime intervals are zero when \( x = \pm ct \). In other words, the spacetime interval between two events on the world line of something moving at the speed of light is \( \text{zero} \). (Time along the axis \( T_i \) is \( \text{imaginary} \), Arthur Eddington\(^3\) - D.C.). Such an interval is termed lightlike or null. A photon arriving in our eye from a distant star will not have aged (it is \( \text{timeless} \) - D.C.), despite having (from our perspective) spent years in its passage.”
Thus, any time we look at the physical world with light, the Platonic world (Fig. 5) placed in the potential future of the arrow of Time (Fig. 4) has already (Sic!) disappeared, like the mysterious cat Macavity, and has already (Ch. 6.5) moved to the potential future of the next 4D event ‘here and now’ (Slide 1), ad infinitum. This cycle is powered by the self-action (Fig. 6). I called it ‘causal field’. It “takes place” in the pre-geometric Platonic world (Fig. 5).

The Platonic world, called here Res potentia, lives in the pre-geometric causal field. There is no metric in the causal field, just as there is no metric in our cognitive structures with which we think. If we take, for example, the notion of a tree, it is not “smaller” than the notion of a mountain. Compared to the physical, 4D partition of the Universe, the entire causal field is timeless. It is the matrix of all living and quantum-gravitational matter, e.g., the human brain (Fig. 3) and the proton (Slide 10 in Quantum Spacetime). It controls the action of gravity as well, for example, the Earth tides and the “inflation” of space (Fig. 7). It is not some Chinese “magic”, nor “bewußten intelligenten Geist” (Max Planck). Sure enough, it is not “dark”. It is neither matter nor psyche: recall the doctrine of trialism (Fig. 5). The latter is not original, as Wolfgang Pauli suggested the common source of matter and psyche in 1948, after Leibniz. Now we can offer a straightforward solution to the mystical anthropic principle in Wikipedia: “the universe would not even be possible if the laws of the universe had been incompatible with the development of sentient life.” Of course the evolution of the physical partition of the Universe will be correlated, since ‘time zero’, with the future emergence of sentient life. We do not accept some “multiverse” containing roughly $10^{770}$ “smaller” universes. There is no absolute meta-observer, which can “see” the global “curvature” of spacetime en bloc, and count these $10^{770}$ “smaller” universes, like the number of angels dancing on the head of a pin.

Thus, the physical “interpretation” of the so-called anthropic principle is parapsychology, no matter how much math you dump in it. Our solution is simple and straightforward, but the model of 4+0-D spacetime (Fig. 10) does not have an exact mathematical description. Not yet.

I suggested new numbers (called hyperimaginary numbers, pp. 8-12 in Can Geometry Produce Work), but the task requires professional knowledge and skills in differential geometry and topology, number theory, and set theory. Help is needed, I am just a simple-minded engineer.

5. Spacetime engineering

The first thing to remember about spacetime engineering (Fig. 6) is that we do not use the squared symmetric “time” in physics textbooks, but the global Heraclitean arrow of Time. We still do not know how the so-called negative mass could be replaced with the potential future (Fig. 4) spanned along the axis W in Fig. 10, and explain the ubiquitous phenomenon of mass-energy non-conservation in the presence of gravity. As of today, physicists cannot explain even the mundane Earth tides. Under these circumstances, any demonstration of spacetime engineering (Ch. 8), involving mass-energy non-conservation, will be most likely brushed away by the established theoretical physics community and voted “magic”.

Suppose, for the sake of argument, that one day some obscure guy decides to fly over the River Thames in London. Many tourists there will be fascinated (they love free entertainment),
but will the established theoretical physicists and mathematicians become interested in spacetime topology (Fig. 10) and the origin of gravity (Fig. 7)? When pigs fly. On 15 February 2020, I announced 5 (five) confirmations of spacetime engineering\(^47\), but nobody showed even a trace of curiosity. It’s like talking to a brick wall. Perhaps theoretical physicists simply hate the possibility that God (John 1:1) could exist “inside” every 4D instant ‘here and now’, as advocated in physical theology. Or perhaps they just don’t care about Physics. Or maybe both.

6. Summary

Many physicists and philosophers have published and promoted their ideas about the physics of the brain and the origin of mind and consciousness, ensuing from their materialistic religion, known as anti-theism. They also deeply believe that that the flow of Time\(^41\) does not exist. Only global hyperbolicity.

One typical example is Thibault Damour\(^48\), who bluntly stated that “the direction of time with respect to which entropy grows, is what determines the sensation of “the passage of time”, through the irreversibility of the process of memorization in the neuronal structures which give rise to the phenomenon of consciousness”. As Murphy noticed, complex problems have simple, easy to understand, wrong answers. Why? Because all these speculations lead to a dead-end. Just read Ch. 1. The main challenge is the ontological embedding of ‘nothing’ (Ch. 6.4) in our Weltbild (pp. 3-4 in Time.pdf) with hyperimaginary numbers. We need new Mathematics.

Here’s why. According to Quantum Mechanics (QM), at any pointwise (at each point of a given set) instant ‘here and now’, the physical world is made of a superposition of many states. The fact that we never see “cats that are actually both dead and alive at the same time” (Viktor Toth) is an unsolved mystery, known as the measurement problem in QM: read again Erwin Schrödinger from 1935 in Ch. 2. Physicists still cannot provide a rigorous presentation of the Aristotelian potentia (Werner Heisenberg), and use only the metaphysical notion of ‘physical reality out there’ from the Theory of Relativity (p. 4 in Time.pdf). For the same reason, they cannot explain the wegtransformierbar gravitational energy\(^47,54\), and never will.

I have been arguing, for many year, that every 4D event ‘here and now’, depicted with the black balls in Fig. 11, is only a 4D “jacket” (p. 23 in Can Geometry Produce Work\(^12\)), also called “shadow” (Fig. 12). To understand the Platonic world, recall the metaphor of Platonic “hand” inside a 4D “glove” at p. 5 in Quantum of Spacetime\(^1\). The only possible path toward quantum gravity (Fig. 10) begins with the joint phenomenon of Time and Continuum\(^1\) (Fig. 11). The facts of the matter are that (i) the human brain\(^11\) can act on itself by itself, and (ii) the common source of matter and psyche\(^7\) is unobservable in principle, even with thought experiments\(^25\).

The task is strictly mathematical. Recall Leibniz’s Monadology from 1714\(^16\): “The monads have no windows through which something can enter or leave.” There is no mathematical model of such unique object, because the monad is not the mundane ‘empty set’.\(^17\) The monad (called “trunk”, see Fig. 5) has no ‘windows’ whatsoever, hence the probability for its observation is exactly zero (Fig. 11). It (not “He”) cannot be grasped even with thought experiment, as it resembles Kant’s Noumenon (Das Ding an sich)\(^18\). It is the source of both matter and psyche — the Platonic world as Reichenbach’s Common Cause\(^19\).
I have tried here to derive my viewpoint from firmly established facts from life sciences and psychology, hoping that at the end of the day I will not encounter any error or contradiction with firmly established facts from theoretical physics. The theory is of course speculative, but physicists should not reject it simply by referring to what they do not know.

Let me enumerate the main points in this book, along with their concise explanations.

6.1. The doctrine of trialism

Suppose you buy a TV from a local shop near you. The exact same TV was in the shop before you bought it and install in your living room. Previously, it was delivered to the shop from some factory in, say, China. So, you can trace your TV to the factory where it was assembled and picture its worldline. Nice and clear. Also, you know very well that the images and sound from your TV are not generated solely inside the TV set: they are broadcasted by some remote TV network, and your TV only facilitates their reception. Again, everything you see and hear from your TV can be traced back to its origin, like the limit of a sequence, at which you stop. What will happen if you replace your TV with your brain, and the images and sound with your psyche? The brain is right there above your neck, but you cannot trace it back to its prenatal stage (Fig. 3) in exactly the same way you did it with your TV. You cannot trace back your subjective world, called for short psyche, to your brain and its “broadcasting TV network”. Something essential is missing. Can’t reach the ultimate limit (Ch. 6.4) and stop there.

The doctrine of trialism – one monad explicated by its two complementary emanations – is aimed at explaining the third missing element in your brain-and-psyche system. The TV factory in China and the broadcasting TV network may share the same location in the physical world, but our case is far more complicated. We definitely need new physics (Ch. 2).

6.2. The Heraclitean arrow of Time

The arrow of Time runs in successive cycles, yielding the infinitesimal displacement in the physical time and space, dubbed Zenon connection. The invisible vertical strips from the movie reel in Fig. 11 do not belong to the assembled (Fig. 14) 4D world (Fig. 10), because they are “before” light. We are “shadows” watching “shadows” (Fig. 12). If we picture Fig. 11 as a movie screen, our “thickness” along the axis W in Fig. 10 will be exactly nullified (Ch. 4). If the ‘movie operator’ decides to stop the ‘movie’ for a coffee break, we will not notice.

We are confined in the physical, 4D partition of the Universe, like the Eskimos in Fig. 12, and cannot “turn around” and look directly at the Platonic world called Res potentia (Fig. 5). We can only see the 4D “shadows” of the Platonic world, cast upon the cave wall (Wikipedia).
Fig. 12. The Eskimos (Fig. 5) are “shadows” watching “shadows”.

We are always guided by our potential future (“carrot” in Fig. 6). In the physiology of activity developed by Nikolai A. Bernshetin, every perception and action is guided by the difference between the future state (Soll-Wert) and the current state (Ist-Wert), called delta-Wert (ΔW). For example, you sit at a dinner table on which there is a glass of water. Suppose you are thirsty (Ist-Wert), so your desired future state (Soll-Wert) is to drink the water and reach your ΔW = 0. You stretch your arm toward the glass of water, in such way that the states of your arm (Ist-Wert) are being continuously adjusted by anticipating the final goal (Soll-Wert) at which you will grab the glass and drink it (ΔW = 0). But you don’t stop there, because your desired future state (Soll-Wert) is a complex set of many various “targets” guiding your goal-directed behavior. Sounds simple, but it isn’t. Unlike the arm of a robot, the human arm is not designed to perform any specific movement, thanks to which your arm can perform any movement. This is the crux of the physiology of activity. Robots are not ‘active’, because they are not guided by their potential future (“carrot” in Fig. 6), but by software programs installed in the ‘hardware’ (Fig. 2). Check out the experiment with your self-acting brain in Ch. 2.

In the quantum-gravitational world, the Soll-Wert is presented with the atemporal matrix; for example, the matrix of a proton (Slide 10 in Quantum Spacetime). The list goes on and on. Back in January 1990, I suggested the most general form of relativistic causality (dubbed biocausality): ‘if P, then Q’. It is applicable to all living and quantum systems, and includes two ontologically different antecedents — P from the irreversible past, and P from the matrix in the potential future (Fig. 4) — which jointly (Sic!) guide the outcomes Q, one-Q-at-a-time (Slide 1). In the inanimate macroscopic world at the length scale of tables and chairs, the matrix — the antecedent P — has vanishing small feedback, which gradually increases in the living-and-quantum-gravitational world, along the (hyperimaginary) axis W in Fig. 10.

NB: The most important question is, and has always been, about the influx of energy (Ch. 3) that makes all living and quantum-gravitational systems self-acting. Is Res potentia (Fig. 5) related to the so-called negative mass\textsuperscript{13,40}? They both are unobservable with light\textsuperscript{12}. See again the metaphor of Platonic “hand” inside a 4D “glove” at p. 5 in Quantum of Spacetime, and the 4+0-D spacetime in Fig. 10. All we know is that the influx of self-acting energy does not come from GW parapsychology\textsuperscript{50}. It is not some paranormal “magic”\textsuperscript{39} either. It is easy to just say ‘may the Force be with you’. The Force is definitely real, but we need quantum gravity.
6.3. Quantum gravity

In addition to the common denominator of gravity and the quantum world\textsuperscript{14} — Res potentia spanned along the axis $W$ in Fig. 10 — we need the so-called Relative Scale (RS) spacetime: read a brief expose at p. 22 in Quantum of Spacetime\textsuperscript{1} and notice the two red arrows in Fig. L therein. I am relativist and do not accept any physical absolute phenomena, such as absolute length scale\textsuperscript{51}. There are two opposite “directions”, starting from the macroscopic world at the length scale of tables and chairs: toward the Small, and toward the Large. At this length scale, all macroscopic observers will see a proton as ‘small’ and a galaxy as ‘large’. True, but in the quantum-gravitational world, the proton and the galaxy will share ‘the same’ RS size. Bottom line is the mutual penetration and entanglement of the Small and the Large (Fig. 13).

![Fig. 13](image)

Nothing in Nature is absolutely “large” or “small”. It’s all relative, as uncle Albert used to say.

6.4. Physical theology

Physical theology has nothing to do with any religion. We cannot have “faith” in calculus, for example. The difference is that the two complementary paths to Nature (Ch. 2) cannot be unified with our cognition, thanks to which we cannot understand Nature. If we could, we will immediately question the origin of Nature and its “final goal”, the “reason” for its existence, etc. Thank God, this is impossible. In one sentence, Nature is smarter. That’s it.

6.5. Spacetime engineering

We certainly can change our anticipated goals, called Soll-Wert\textsuperscript{19} (Ch. 6.2) and depicted with the carrot in Fig. 6. In this sense, our goal-directed behavior is a ‘mild’ spacetime engineering. Once you include a distant physical system in your perceptual space and body schema, you will obtain a new sensation of your “carrot” (Fig. 6), and you’re ready to go. As I stated above (Ch. 2), it works better than a Swiss watch. However, there are tons of issues with the physical
mechanism of spacetime engineering, starting with the biological entanglement of your brain and the distant physical system. There is no possibility for biological entanglement in the QM textbooks, and we cannot explain what might look like a macroscopic quantum tunneling.

Also, the perpetual emission and absorption of virtual particles in particle-antiparticle pairs is not a temporal process evolving in the physical time ‘as read with a clock’ — at any instant we see only their end result (e.g., a proton), and at the same instant their ‘source’ has already disappeared (Ch. 4), like Macavity. Why? Because the ‘source’ does not live in the physical world modeled with the light cone: read Erwin Schrödinger from 1935 in Ch. 2. We need the atom of geometry (Fig. 4) to “split” the photon and reach the atemporal “dough” of virtual particles and the atemporal source of gravitational energy (Ch. 5), in RS spacetime (Ch. 6.3).

Again, we do not use the physical time, pictured with the zipped fixed section in Fig. 14.

Fig. 14. The unzipped Platonic section is the unobservable Macavity.

The fundamental difference between the assembled (zipped) 4D spacetime endowed with metric, and the atemporal pre-geometric Res potentia (the “carrot” in Fig. 6) is that the former is irreversibly fixed in the past, whereas the latter is the flexible “carrot” (Ch. 2) living in the potential future (Fig. 4) in the arrow of Time. It is crucially needed in Physics (Ch. 1), but is banned in GR textbooks. You can lead a horse to water, but you can’t make it drink. Why? Because of GW parapsychology?

Anyway. What matters here is that everyone can learn spacetime engineering (Fig. 6). The learning process is similar to learning a new motor skill, for example, to juggle three balls in the air (pp. 21-22 in Quantum of Spacetime). All you need is available at my website. Take it and use it for your purposes. It is not parapsychology (ibid., M2 at p. 13). It is the future.

As of today, nobody is interested. The latest feedback to my theory, launched in July 1997, came nine years ago from Maurice de Gosson at the University of Vienna: “Buzz off, idiot!” (Mon, 21 May 2012 18:47:46 +0200).

Any other suggestion?

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June 6, 2021, 10:37 GMT
7. Appendix 1

How do we explain the event ‘here and now’? How Nature creates the ultimate limit (Fig. 15)? Does it (not “He”) have to stop there? JAIN (yes and no). It does stop in the physical, 4D world, but not in the Platonic world along the axis $W$ in Fig. 10. It is an infinite cycle (Ch. 4).

The “firecracker” (Fig. 15) smoothly follows a special “unphysical” manifold (Roger Penrose) inflated exactly to infinity ($\Omega = 0$), with sheer imagination. How can any physical stuff, even a light beam, actually reach the ultimate endpoint and stop there, like at the edges of a pizza? Perhaps with some advanced math (Helmut Friedrich) and GW parapsychology? No way José. We do not tolerate mathematical poetry, like “local differential geometry” (Robert Geroch).

The issue is strictly mathematical. It is rooted on the topology of spacetime (Ch. 4). Currently, theoretical physicists use only the physical time (Ch. 3) from the ‘clock’ in the expanding 4D “surface” of the balloon (click Fig. 7). But this physical time is inevitably squared, and the “time-orientable Lorentzian manifold” contains only two symmetric future/past “vectors” (Piotr Chrusciel). It’s like the ancient god Janus looking simultaneously along the future/past.
Moreover, mathematicians have to choose between two topological alternatives: either the spacetime interval is ‘open’ and hence does not contain its endpoints, or it is closed and bounded (compact), as explained eloquently at Wikipedia below. This is how bartenders think.

In mathematics, more specifically in general topology, **compactness** is a property that generalizes the notion of a subset of Euclidean space being closed (i.e., containing all its limit points) and bounded (i.e., having all its points lie within some fixed distance of each other).[1][2]  

Fig. 16.

In my theory, every spacetime interval is both ‘compact’ (Fig. 16) in the irreversible past, and ‘open’ in the potential future (Fig. 4 and Ch. 4). Have your cake and eat it.

Thus, all physical systems can exactly (Sic!) reach their endpoints from a closed interval in their irreversible past, and at the same instant are shifted to an open interval short-circuited with the Platonic world in the potential future (Slide 1). In the physical world placed in the irreversible past (Fig. 4), there is no “superposition” whatsoever (Ch. 6), and the Ghosts of departed Quantities (George Berkeley) are exactly re-nullified, once-at-a-time, ad infinitum.

**NB:** We cannot in principle reach the intact quantum cat (read Erwin Schrödinger in Ch. 2) nor the Platonic wegtransformierbar gravitational energy if we use only the physical time. It is not like the example with tracing back the TV factory in Ch. 6.1. If people believe could solve the puzzle with the current physics (Ch. 6), they will make QM a mundane statistical theory, and will also convert gravity to some brand new physical field: read Zhao-Yan Wu in Ch. 3.
Yesterday (30 May 2021), I kindly invited two renowned theoretical physicists to write up their critical opinions on the issues raised in Ch. 4 and Ch. 6.5. Surely they will disagree with my interpretation of ‘before light’. As soon as I receive their papers (hopefully by Christmas), I will gladly include them at p. 28 below, without any comments. They will have the last word. I might only quote from their papers in March 2022. The fun part is just around the corner!

31 May 2021, 21:28 GMT

The two contributions by Adam Helfer and Peter Milonni, in PDF, will be inserted at p. 28. They will not accept my interpretation of ‘before light’ (Ch. 10), and will have to solve the following conundrum. We have an object, called A, which is not directly observable with the physical time ‘as read with a clock’. We can observe only another, definitely physical, object, called B, which is caused by A, namely, if A then B. The object A stands for (i) the intact, not-yet-observed quantum state in QM (cf. Erwin Schrödinger in Ch. 2) and the negative energy densities in QFT, and (ii) the “intangible” gravitational energy capable of producing Earth tides. I am sure Adam Helfer and Peter Milonni will not accept my interpretation, and will rigorously explain how A, in the cases (i) and (ii), could be short-circuited to B along the physical time ‘as read with a clock’, so that A can produce B. But if they cannot, I do hope they will explain why. With lots of math (hopefully). Now replace A with the potential future, and B with the physicalized past (Fig. 4) in the arrow of Time (Fig. 9a). Voila. Neither the two gentlemen mentioned above nor their esteemed colleagues can short-circuit A and B, because they have at their disposal only the physical time, but the latter necessarily requires the mundane ‘physical reality out there’, like the state of the Sun when nobody is looking at it (p. 4 in Time.pdf). This type of reality is not applicable to QM or QFT (i), nor to GR (ii).

Why is this important? You will need to know much more about cases (i) and (ii), in order to practice industrial spacetime engineering. Take the experiment with your self-acting brain in Ch. 2: instead of working with two mental images of clocks, you could work with the complex phase of virtual “particles” (e.g., Peter Milonni) and mitigate the constraints on “negative” energy. It is not Chinese “magic” for sure. Perhaps you need to get a grip on the matrix of matter (Max Planck), controlling the quantum-gravitational world (Slide 10) and the living organisms, such as the human brain (Fig. 3). How about the so-called evolution equation?

8. Appendix 2

A brief note on spacetime engineering (Fig. 6), from the horizontal section of Fig. 5.

The vertical section of Fig. 5 stands for the ‘engine’ of spacetime engineering: the Heraclitean arrow of Time, explained in Ch. 2 and in my first video presentation from 15 January 2020. We do not “move” anything. There is no “mind over matter” or any other parapsychological crap. We only tweak the potential future depicted with the carrot in Fig. 6. Read pp. 10-11 above.
Let me zoom on the horizontal section of Fig. 5 above.

First, what is Res cogitans? And what could be the ‘agent’ (sit venia verbo) operating with the mental representation (qualia, cf. Wikipedia) of the tree branches in Fig. 3 and the two analog clocks in the experiment at p. 5? Any mental representation, no matter how subtle, always has delocalized neural correlates spread across the entire brain, which requires that the ‘agent’ (we usually talk about it as ‘human self’ or ‘me’, and point to the chest) has a special physical (Sic!) mediator in the human brain, called ‘causal field’ (Fig. 3). Again, this mediator cannot be replaced with “logical operations” (Fig. 2): read the doctrine of trialism at p. 3 above.

All this may sound quite complicated, so let’s use a very simple example: the redness of ‘red’ (Wikipedia). Suppose its physical correlates are around 650 nm EM wavelength. It is still totally unclear how the physical correlates are converted (not “encoded”) into the neurophysiological correlates of what will be perceived as ‘red’, from the optical apparatus of the human eye to the immensely complicated visual cortex. Surely there is no ‘red stuff’ in the brain, only some perpetually changing neurophysiological correlates, which are unique in every brain, at any instant. We may wish to call the ‘red’ Rot (German), nyekundu (Swahili), or Hóngsè de (紅色的, Mandarin), and in all these instances the neurophysiological correlates will be different.

There is no invariant object in all human brains, isomorphic to the meaning of ‘red’. Another example of ‘meaning’ is shown with the four sayings below (p. 16 in Quantum of Spacetime):

1. You can’t hide a piece of broccoli in a glass of milk.
2. Only dead fish go with the flow.
3. Don’t wear polka dot underwear under white shorts.
4. A fish has no concept of water.

Which sayings present similar meaning? My answer: 1 & 3. Your brain is different from mine, you may use different languages, etc., but we all can and will identify the invariant meaning.

Where does it come from? From what I called ‘cognitive vacuum’. How does it exist? Like the quantum vacuum\textsuperscript{13,43}. Both vacua are ‘potential reality’ dubbed Res potentia above. Notice that the so-called cognitive vacuum is UNSpeakable. When searching for particular word, for example, we “scan” the entire cognitive vacuum en bloc, but we “see” only particular mental presentations (recall the experiment with your brain at p. 5) carrying different meanings, from which the ‘agent’ chooses the desired one. We can never directly interact with our common cognitive vacuum (Carl Gustav Jung called it Das kollektive Unbewusste), just as we can never directly interact with the quantum vacuum itself\textsuperscript{43} — we can “see” only energy differences\textsuperscript{13}.

As I tried to explain on 20 December 1998, we operate simultaneously at two layers, Platonic ideas and their concrete ‘here-and-now’ explications. The former cannot “collapse” (p. 9 and Ch. 2), and has two complementary explications, both of which (Sic!) inhabit the potential future in the Heraclitean arrow of Time (Fig. 4). Thus, if we alter the potential carrot (Fig. 6) with our MCVM (Ch. 1), the potential states of the physical world will be altered accordingly, and we will practice spacetime engineering\textsuperscript{53}: if we change the ‘arm’, the ‘nose’ will change accordingly, and vice versa (Fig. 5). This is The Bridge (April 2014). It is not Chinese “magic”\textsuperscript{39}.

Yes, my theory is speculative, like the dubious map used by Christopher Columbus in August 1492. But if he didn’t go west, with the insane hope to find some shorter route to the Far East, he could have never discovered America. Besides, we have no alternative “route” (Ch. 10).

What do you prefer, my dear reader? GW parapsychology\textsuperscript{50}? Or maybe nuclear fusion plants?😊
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“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  
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Monadology §7: “The monads have no windows through which something can enter or leave.”

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moreover, that neither event is a cause of the other. Then, Reichenbach’s Common Cause  
Principle (RCCP) states that A and B will have a common cause (…).”

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Note: Check out Macavity\textsuperscript{33} at sub-photon level, that is, “before” light (Ch. 4).

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Note: Time (Carlo Rovelli) and energy are intrinsically nonlocal (Laszlo Szabados), yet we can observe only their local values: “In relativity a non-localizable form of energy is inadmissible, because any form of energy contributes to gravitation and so its location can in principle be found”, says Sir Hermann Bondi. “But then what does it mean?” (Erwin Schrödinger, Ch. 2). It means that QM and GR are essentially incomplete. Read NB in Ch. 7 and the final note.

https://www.directtextbook.com/isbn/9780511564253  

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“It follows immediately that for any Cauchy surface \( \Sigma \), we have edge \((\Sigma) = \emptyset \).”  
Note: Will the maximal Cauchy surface (R. Schoen and S.T. Yau) include the “edge \((\Sigma) = \emptyset \)” in a closed interval (Ch. 7)? Can you reach the “edge \((\Sigma) = \emptyset \)” of a 4D pizza?

57. Regarding the note at the last page in Ch. 7: the simplest example of physicalized object, denoted \( B \), is the photon. It is a “jacket” (p. 23 in *Can Geometry Produce Work*) depicted with four balls in Fig. 11. The balls are “separated” by invisible — with light vertical strips: perfect continuum. Physically, the omnipresent Ether (Ch. 3) is squeezed to zero, matching the “size” of all 4D spacetime points (four balls in Fig. 11) of joint emissions-and-absorptions (like clapping hands, see Slide 1) of photons (Slide 9). Thus, \( B \) is caused by \( A \): the Platonic Ether (Ch. 3) modeled with the axis \( W \) in Fig. 10. Physicists claim that light “propagates” in the “vacuum” depicted with black outer space in Fig. 9b. True or false? JAIN (yes and no).

Light does not propagate anywhere, because its proper time is null: “A photon arriving in our eye from a distant star will not have aged, despite having (from our perspective) spent years in its passage.” Light itself (A) is a timeless atemporal web bootstrapping the Universe. Only light’s “jacket” (B), called photon, propagates in the physicalized partition of the Universe. There is only ONE multiplicative photon with zero rest mass \( M^2 = 0 \); all the rest is ‘retarded light’ with positive mass-energy. The latter is also an example of the “jacket” B: read again the note at the last page in Ch. 7. Physicists suggest some weak energy condition, yet they acknowledge that the strong energy condition “is strongly violated in any cosmological inflationary process” (Wikipedia). But if one of the energy conditions is violated, the rest must be violated as well. It’s a package. Even one “negative” particle (Adam Helfer) will nullify the entire physical world, quietly and instantaneously. The puzzle is very complicated, and the so-called hyperimaginary numbers are still out of sight. The state of affairs resembles the chemistry in 1799. We cannot make any progress though, as theoretical physics is vehemently contaminated with GW parapsychology. As of today, nobody cares about Physics (Ch. 1). Nobody. The only feedback hit me nine years ago, in May 2012 (Ch. 6.5): “Buzz off, idiot!”.
10. Contributions

The first contribution to *The Physics of Life* was made by Erwin Schrödinger in 1943 (p. 2): “we must be prepared to find a new type of physical law.” My invitation for contribution was sent to many physicists and mathematicians two months ago, and I offered them to prove my ‘new type of physical law’ false (p. 18). I expect to receive their contributions by Christmas this year, and will include them below, without any comment. Hence the reader will benefit from their professional insights and will compare them to our theory and experimental facts.

Back in 1987 (p. 4 in *Quantum of Spacetime*), I suggested two types of distances in what was later called $4+0$ D spacetime (pp. 12-13 in *Experimental Tests of Spacetime Engineering*): metric distance (local mode of spacetime), and a pregeometric Platonic world (global mode). Physically, the latter is exactly zero (Fig. 10), resembling a single geometric point inflated to actual/absolute infinity (G. Cantor). Hence the pregeometric Platonic world is simultaneously “inside” the instant ‘here and now’ (Fig. 4) and “outside” the physical 4D world. Needless to say, the so-called hyper-complexified spacetime in Fig. 10 is completely different from the complex Minkowski space or the H-space.

In my opinion, the model of spacetime in GR is essentially incomplete (H. Ohanian). It is based on ridiculous speculations and leads only to wishful thinking (H. Puthoff). Get real. We need new Mathematics. Physically, the squared axis $W$ in Fig. 10 is zero: $|W|^2 = 0$.

Read NB at p. 17. Recall (p. 18) that case (i) refers to QM and QFT textbooks, and case (ii) to current GR. Regarding QM, recall the intact quantum state, after Erwin Schrödinger in Ch. 2:

The rejection of realism has logical consequences. In general, a variable has no definite value before I measure it; then measuring it does not mean ascertaining the value that it has. But then what does it mean?

The intact quantum state is the Platonic *Res potentia*: before its measurement, it does not live anywhere on the light cone. The act of measurement projects its physicalizable “jackets” into the physical world via the apex of the light cone: “one always takes the real part at the end” More at p. 9. If you could short-circuit the *Res potentia* with its fleeting 4D “jackets” along the physical time (p. 4 in *Time.pdf*), you will make QM a simple statistical theory (p. 17).

Regarding QFT: The quantum vacuum (e.g., Peter Milonni) is also Platonic *Res potentia*. If you could short-circuit the Platonic *Res potentia* with its fleeting “jackets” in QFT along the physical time, you will flood the vacuum with real particles ‘out there’ (p. 4 in *Time.pdf*), which contribute to gravity, which immediately leads to the cosmological constant problem.

Regarding GR: read again p. 17 and H. Ohanian. If GR and QFT are too difficult, focus on QM above. If you reject my conceptual solution (p. 9), you will have to explain Charles Wilson’s discovery from 1911. And if you can ‘square the circle’ below, you might also discover “time operators” in QM. ☺
CERN uses modern versions to measure the quantum “jackets” in the so-called standard model. They cannot explain the effect from 1911 either, so the talibans at CERN blocked my email. I was only trying to help them, as quantum chromodynamics cannot explain even the proton. Before spending $13.25 billion for some “Higgs field”, CERN should have done their homework.

**NB:** You shall not waste money earned with hard labor by millions of people. Read also p. 5 and p. 10 (last) in explanation.pdf, and the bold facts of GW parapsychology\(^50\).

**Acknowledgements**

I am deeply grateful to the Eugene Higgins Professor of Physics and Natural Philosophy at Yale University Henry Margenau for his moral support and encouragement in June 1990, and to my parents Gocho G. Chakalov and Dany Chakalova for their love and financial support. They went back home and are now with Jesus.

D. Chakalov

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**Invited contributions**

Peter W. Milonni flatly rejected my invitation for contribution to this book (p. 18), and wrote (June 14, 2021): “I will not pay further attention.” His reply essentially matched the feedback from his colleague at the University of Vienna in May 2012 (p. 15), but was far more polite.

The contributions by Adam Helfer and his colleagues (p. 18) will be inserted below. You need to know much more (Appendix 2) to practice industrial spacetime engineering. I’m fine. ☺
The contributions by Adam Helfer and his 88+ colleagues will be inserted above ↑, without any comments. As stated previously, I might only quote from their papers in March 2022 (p. 18).

Let me briefly explain the first part of my video talk Spacetime Engineering 20153, which deals with energy non-conservation34,35 — read the illustration with apples (apples.jpg) at p. 12 in Quantum of Spacetime1, and notice the so-called evolution equation from 8 November 2015 (p. 24 in rs_spacetime.pdf and p. 4 in zenon.pdf) at pp. 3-4 in Gravitational Energy47. The equation is still in symbolic form, pending the precise formulation of quantum gravity (Sec. 4):

$$\|w\|^2 = \|m\|^2 + \|m_i\|^2 \quad \text{(Eq. 1).}$$

Eq. 1 does not show the intangible, not-yet-squared Platonic world30, but the dynamic balance of the real mass (m) and the imaginary mass (m_i), shown in diagram.jpg. In the physical world, the left-hand side at Eq. 1 is always re-nullified25 (recall the cat Macavity43). The second term \(\|m_i\|^2\) at the right-hand side in Eq. 1 always creates “negative mass”40, so I will rewrite Eq. 1:

$$\|m_i\|^2 = \|m\|^2 \quad \text{(Eq. 2).}$$

If you rotate Eq. 2 at 90 degrees clockwise, you will obtain the ‘drawing hands’ by M. Escher. Notice that the physicalized \(\|m\|^2\) at the right-hand side in Eq. 2 contains an input (Sic!) from \(\|m_i\|^2\) smuggled into the squared mass \(\|m\|^2\), which enables the entire ‘retarded light’57 in \(\|m\|^2\) to perform self-action (p. 6 in Can Geometry Produce Work12): read again p. 5 above. Thus, we can eliminate all “dark matter” and “dark energy” with the Platonic ‘hand’ in 4D ‘glove’ (p. 5 in Quantum of Spacetime1). The ‘glove’ (the physicalized \(\|m\|^2\) at the right-hand side in Eq. 2) will exhibit self-action by additional (p. 13) energy, momentum, and angular momentum. At each and every instant from the time read with a clock (p. 4 in Time.pdf), the total energy will be made entirely positive and re-balanced (Eq. 1). Not “conserved”.

Try the so-called Relative Scale (RS) spacetime (p. 14) with variable rate of Time (Fig. 14): the global phenomenon, creating the Large and the Small (Fig. 13), will create gravity locally, by “shrinking” the metric to produce local gravitational attraction, and at the same instant by “inflating” the metric in the remaining part to produce local gravitational repulsion, so that the two tug-of-war manifestations of gravity reach dynamic equilibrium. Again, it is a balance. Not “conservation”. We need Mathematics (p. 10).

Don’t call the Platonic hand “mystery matter”. Parapsychology sucks, with or without math. What kind of stuff (p. 7) empowers the Earth tides33? You have to start from scratch ASAP.

The second part of Spacetime Engineering 20153 is about brain-controlled quantum tunneling52. Again, it is not some weird “magic”39: read p. 12 in facts.pdf. Should you wish to learn more, follow steps (1)-(2)-(3) at p. 5 in explanation.pdf. I will reply within five working days and will gladly send you the requested information, along with the link to Spacetime Engineering 20153.

D. Chakalov
August 6, 2021, 12:15 GMT