

What's an intuitive description of curved spacetime?

Traruh Synred claims that the metric, which specifies how to determine the distance between events, “does vary from place to places to place and stuff moving will follow the ‘shortest’ path (a geodesic). That’s gravity.” That’s a spherical-cow approximation.

In order to suggest an “intuitive description of curved spacetime”, may I notice that the alleged “curved spacetime” *cannot* explain the first thing we observe every day: [Earth tides](#). To quote [Stacey \(Steven\) Harris](#), the pool of water molecules making up the world’s oceans is acted by “the moon’s gravity and its effects on the Earth (also a somewhat lower effect from the sun’s gravity).” But the so-called “curved spacetime” offers only a [purely mathematical](#) (and non-tensorial, [John Steele](#)) object called [Christoffel symbols](#), which cannot *rotate* the Earth *and* pull up↑ rocks. Why not? Because gravity does not and *cannot* have access to some pool of energy-momentum and angular momentum to ‘act back’ on its physical source placed at the right-hand side of Einstein’s field equations. In this sense, [gravity](#) is not a ‘natural force’ ([Zhaoyan Wu](#)). As [Jess Brewer](#) rightly noticed, some things aren’t simple. I [fully agree](#) (p. 4).

Let me go back to the 4th letter by Isaac Newton to Richard Bentley from [December 1692](#), in which he rejected the idea that “one body may act upon another at a distance through a vacuum (Sic! - D.C.) without the mediation of anything else”, and added: “Gravity must be caused by an agent acting constantly according to certain laws, but whether this agent be material or immaterial is a question I have left to the consideration of my readers.”

Thank you, Sir Isaac. The Newtonian ‘vacuum’ could be the [Platonic](#) world, which is [neither material nor immaterial](#). It is a [pre-geometric](#) medium (called ‘[global mode](#)’ of 4+0 D spacetime) shown as “dark space” in the first drawing in the Addendum below. It channels the [Fifth Force](#) by a [pre-geometric](#) point stretched to the size of the [entire 4D physical world](#) (the latter is called ‘local mode’ of 4+0 D spacetime; see the second drawing). Any other suggestions?

D. Chakalov

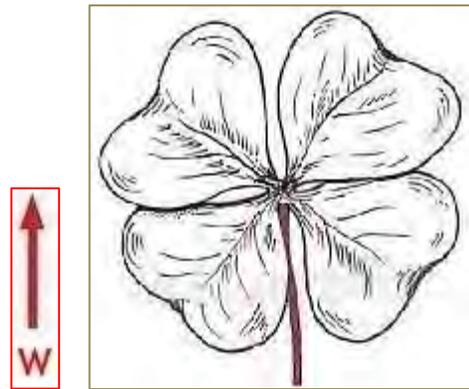
<http://chakalov.net/#reports>

Addendum

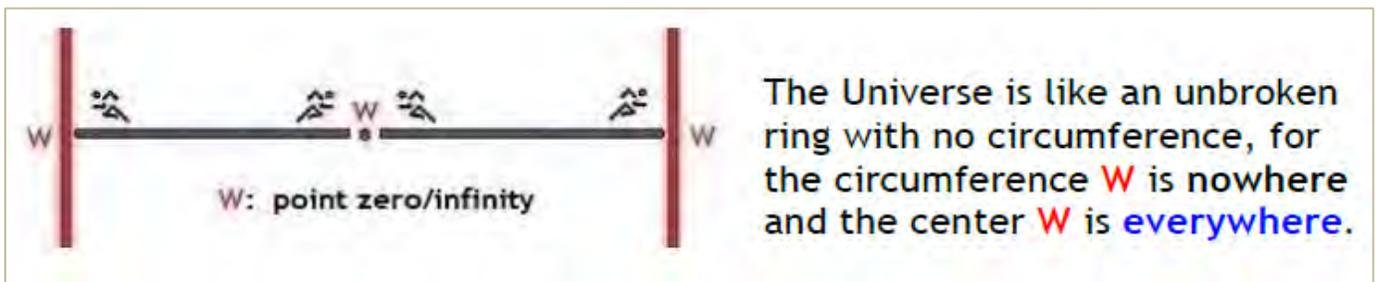
The Newtonian ‘vacuum’ is identified with the **Platonic** world, which is **neither material nor immaterial** entity. In theoretical cosmology, it is depicted with “dark space” encapsulating the *entire* 4D physical world ([Ellis_edge.jpg](#)): see at left Case A in Table 1, reproduced from p. 7 (last) in [history.pdf](#). Important: the vector **W** is the **arrow of Time** after Heraclitus (*ibid.*, p. 6) and the physical world (“closed room”) is shown as open (flattened) lily with **four leaves** below.



Case A ([energy.jpg](#))



The “location” of the **Platonic** world is denoted **W** in the drawing below, from p. 19 (last) in [talk.pdf](#). Notice that **W** lives *simultaneously both* “inside” every 4D instant ‘here and now’ and “outside” the *entire* 4D physical world (the lily).



Briefly, I offer a new ‘no boundary’ proposal and new *hyperimaginary* numbers ([Slide 2](#)): physically, the *atemporal* **Platonic** world at the “boundary” **W** above is *always squared* (p. 16) and *completely* eliminated as “nothing”, in line with ‘the general rule’ ([QM_rule.jpg](#)). Hence **quantum cosmology** is replaced with **physical theology**: read first [chakalov.net/text.pdf](#) and [chakalov.net/talk.pdf](#).

Sure enough, people won't dive into my theory before they find out whether it is falsifiable and can be refuted. For example, Hartle-Hawking 'no boundary' proposal ([Steve Carlip](#)) is falsifiable and can be immediately refuted, because "there needs to be a transition from the Riemannian metric (...) with imaginary time at the Big Bang to a Lorenzian metric with real time" ([Wikipedia](#)) from the [scale factor in cosmology](#). But this cannot be accomplished with [Wick rotation](#) and the Hartle-Hawking 'no boundary' proposal is for the birds. Sad but true.

My [theory](#) is also falsifiable and can be refuted. All you have to do is to prove any of the *blueprints* of the arrow of Time (p. 6 in [history.pdf](#)) redundant or false, as I offered on [31 May 2021](#). In physics ([Wikipedia](#)), a list of blueprints (B) of the arrow of Time stems from the [missing potential future](#) of the *lily*:

B1. There is no [physical engine](#) of [causality](#) to produce the difference between the past and the potential [future](#). Try e.g. to find the so-called "[dark energy](#)".

B2. In the [orthodox theory of gravity](#), such engine is banned ([R. Geroch](#)).

B3. There is no *physical* "edge" of 4D spacetime ([G.F.R. Ellis](#)) of the *lily* [above](#).

B4. The proposed [re-interpretation](#) of "negative mass" and "dark energy" is unique. In [GRBs](#), it allows the [positive energy](#) release to reach 8.8×10^{54} ergs.

NB: Try to prove any of the of *blueprints* above either redundant, because you can offer another solution, or plain false. Please use math as much as you can.

Obviously, there is no *direct* proof of the [arrow of Time](#). But as Arthur Conan Doyle remarked, when you have eliminated the [impossible](#), whatever remains, however improbable, must be the truth. For example, [spacetime engineering](#).

I hope to offer the experimental proof by 31 December 2022: watch [YES.mp4](#).

Needless to say, the [orthodox theory of gravity](#) offers [different predictions](#). Have you seen [pink unicorns](#) dancing with [red fat herrings](#)? Ask [Kip S. Thorne](#). Explanation at pp. 7-9 in *The Fifth Force: Proof of Concept* ([text.pdf](#)). If you wish to learn more, follow closely the instructions at [this http URL](#). Good luck.

D. Chakalov

5 October 2022

Last update: 17 November 2022, 00:35 GMT

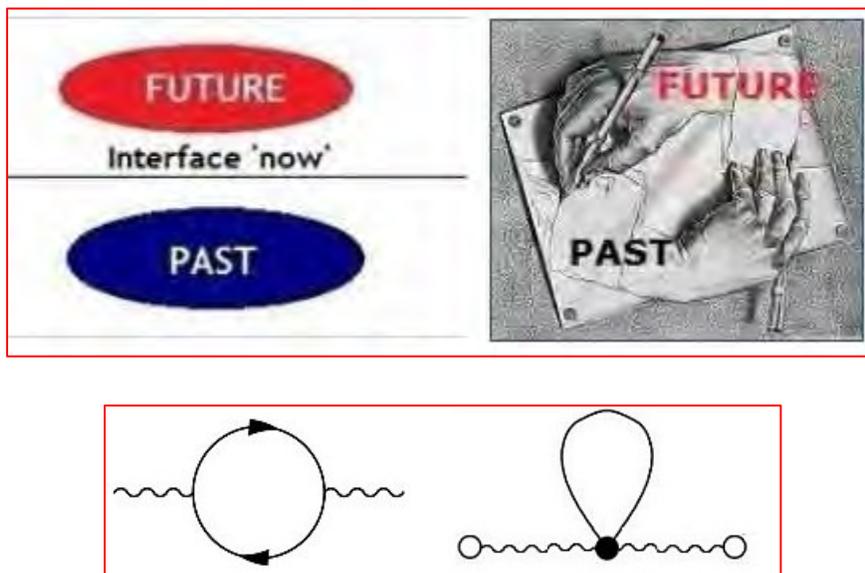
<http://chakalov.net/#reports>

Reflections and Clarifications (RAC)

R1. I can't understand your B1 [above](#). What do you mean by potential **future** ?

C1. First, the potential **future** of the arrow of Time is *completely* eliminated in the [orthodox theory of gravity](#) – you have a [dead frozen snapshot](#) (R. Geroch) of one single 4D “lily” (p. 2). The physical time there is “[symmetrical](#)” in the sense that you can move from “past” to “future” and back just like you move from left to right and back. This obviously false picture of Nature is inevitable in the current theory of relativity. The latter is amended with the two *modes* of 4+0 dimensional spacetime ([two_modes.jpg](#)) in which the *global* mode harbors the potential **future** of the arrow of Time: read p. 6 in [history.pdf](#).

Thus, every 4D “lily” (p. 2) has non-trivial structure, topology, and dynamics, resembling Escher's [drawing hands](#) (p. 3 in [text.pdf](#)): click the drawings below.



Notice that the *global* mode of spacetime, which harbors the potential **future** – the **loops** above – can explain how “one body may act upon another at a distance through a vacuum without the mediation of anything else”, as Newton wrote in December 1692 (p. 1). Here the Newtonian ‘vacuum’ is the *atemporal Platonic* world (it's right above [your neck](#)) in my ‘no boundary’ proposal (p. 2).

In practical terms, my ‘no boundary’ proposal suggests [unlimited clean energy](#) from gravitational rotation (p. 4 in [text.pdf](#)). I am not interested in “[magic](#)” or some alleged “[translocations](#)”. Only wish to fly like a [gimbal](#) (p. 6 in [text.pdf](#)).

In mathematical term, the Newtonian ‘vacuum’ viz. the **Platonic** world (p. 2) is the *ambient* infinite-dimensional Euclidean space in which all manifolds live: read pp. 11-13 and p. 19 (last) in [talk.pdf](#). This *ambient* infinite-dimensional Euclidean space is not some “extraneous structure” (J.M. Lee). You can’t paint a picture without a canvas. On the other hand, the *ambient* ‘canvas’ must be completely removed in 4D spacetime (the *lily*): the *infinitesimal* shift $Q_1 \rightarrow Q_2$ along the arrow of Time (*ibid.*, Fig. 10 on p. 15), executed by the Fifth Force (*ibid.*, p. 2), must be completely removed in the “collapsed” lily (p. 2 [above](#)).

Here’s an illustration. Consider two *neighboring* points Q_1 and Q_2 , shown below with blue | yellow ([second countable](#)) drawings, and separated by the **Platonic** world (p. 2) viz. the *ambient* infinite-dimensional Euclidean space or ‘canvas’.



Robin Le Poidevin: If between any two points in spacetime there is always a third point, can anything touch anything else?

The blue and yellow drawings must be *separable* ([Hausdorff](#)), or else they will fuse into one single green blob and you could not contemplate any [topological space](#). But on the other hand, the **red** ‘canvas’ must not be present in the “collapsed” 4D lily (p. 2 [above](#)). There is [only one way](#) to solve the puzzle.

Follow the links and let me know what you could not understand. It will be entirely my fault. For more, read [text.pdf](#), [history.pdf](#), [talk.pdf](#), and [RS.pdf](#), and watch [YES.mp4](#) (95 sec). If nobody replies by the end of November, I will demonstrate next year modified gravity (p. 4) to the general public by flying over the River Thames in London. Praise the Lord and pass the ammunition. 😊

I do hope to receive confirmation from any of these 16 labs, 13 in Europe and 3 in Israel, by the end of November 2022, and include their report from their lab in this video. Then I will upload the full video on YouTube and on Vimeo by the end of December this year.

Read again pp. 10-11 in
<http://chakalov.net/text.pdf>

R2. Naah, you can't fly. Forget it.

C2. I certainly cannot like a 'gimbal' (p. 4). It may be possible to fly over the [River Thames](#) (not [along a bus](#)), nice and slow, but the challenge is very tricky, like learning to juggle three balls (p. 3 in [text.pdf](#)). The underlying hypothesis, which I called '[the bridge](#)', is based on the so-called [fabric of spacetime](#): is it a '[colorless](#)' monad? If yes, does it have specific [mental correlate](#)? Perhaps the hypothetical [cognitive vacuum](#)? If we learn how to employ 'the bridge' (p. 4) to eliminate ([reversibly](#)) our weight, we should be able to fly like we "move" our thoughts, as I hinted on [30 May 2002](#). Those who claim that flying by modified gravity is not feasible should recall the operational definition of 'impossible': try to put on your jeans through your head.

As [Lao Tzu](#) pointed out, to the mind that is still, the whole universe surrenders. You only have to master the [Law of Reversed Effort](#) and allow the [Fifth Force](#) to unfold inside you, effortlessly. If you know some math (p. 5) and do *not* buy the [orthodox theory of gravity](#) and its "predictions", it will work much better.

NB: In [4+0 D spacetime](#), gravity (i) [alters the flow of Time](#) (p. 2 in [RS.pdf](#)) and (ii) triggers the Fifth Force (p. 2 in [talk.pdf](#) and p. 9 in [text.pdf](#)). To grasp the '[colorless](#)' [Substanz von Raum und Zeit](#), read closely p. 1 and B1 - B4 at p. 3.

But here's the catch. Suppose I fly next year over the River Thames in [London](#). Many tourists there will be fascinated ([tourists love free entertainment](#)), but will the established mathematicians and theoretical physicists become slightly interested in [spacetime topology](#) and the [origin of gravity](#)? And when will they admit that the 4D spacetime pictured with the lily at p. 2 is being [dynamically re-assembled](#) (Sic!) to produce an [invariant spacetime interval](#)? When [pigs fly](#).

Sorry, I am sick and tired from talking to a [brick wall](#). The sole reason for this exercise will be to promote to the widest possible audience my proposal for [unlimited clean energy](#) with gravitational rotation (p. 4 in [text.pdf](#)). Time is [running out](#).

R3. But how can you fly? I don't get it!

C3. Kalimera [Stavros](#)! Thanks for you colorful reflection. To paraphrase your question in the framework of the doctrine of [trialism](#), how can the "nose" fly by modified gravity? [Easy](#). Read about the [Platonic](#) "trunk" at p. 3 in [talk.pdf](#).

Let me clear a possible confusion (R2 above). Read p. 6 in [RS.pdf](#): the **Platonic** world does exist, but “before” **light**, like Eliot’s cat **Macavity**. In order to fly by modified gravity, first you have to eliminate (**reversibly**) your weight *before* it is being **re-fixed**, once-at-a-time along the **arrow of Time**. Namely, you have to access the next **potential** state of your “**carrot**” *before* it will be **re-fixed**. And let me assure you that **spacetime engineering** works better than a Swiss watch.

Perhaps the most “counterintuitive” hypothesis is about **re-assembling** (Sic!) the **invariant spacetime interval** during the *flow* of Time (read NB above). In the **orthodox theory of gravity**, *any* dynamical phenomenon is necessarily wiped out *completely* from the outset (**R. Geroch**): the 4D “lily” (p. 2) is **dead frozen**. To understand their hypothesis, imagine a car travelling *always* with some fixed (**invariant**) speed, say, 10m/sec. In the drawing below, AB = 10m. The car will *always* trespass it for 1sec. No more, no less*. So, you can combine the car and the road and talk about ‘1 sec of car’s time’ à la **E.F. Taylor and J.A. Wheeler**.



Here, the car will not ‘assemble’ the road. But in **4+0 D spacetime**, we suggest a completely different hypothesis: see the zipped spacetime at p. 2 in [RS.pdf](#). Physicists like **W.G. Unruh** have *no idea* what stuff could **slow down time**. And since we must keep ‘1 sec of car’s time’ **invariant**, the only way to solve the puzzle is to introduce the **rate of Time**, as explained at my [website](#). Notice that the **rate** of Time is a non-relational dimensionless variable (like 1sec/sec), which is postulated to **re-assemble** (Sic!) the **invariant spacetime interval**. The **rate** of Time is *not* the speed of the car above. It is the non-relational “speed” of the **flow** of Time. To quote from p. 2 in [RS.pdf](#), a smaller zipped interval *assembled* with lower “speed” is like a greater zipped interval *assembled* with greater “speed”. This is the crux of Relative Scale (**RS**) **4+0 D spacetime**. The end result is an **immensely powerful** Fifth Force. Not the idiotic “**dark energy**”.

We do need **unlimited clean energy** (p. 4 in [text.pdf](#)). Time is **running out**.

To explain the “counterintuitive” ansatz at p. 7 above, let me stress *what* the non-relational “speed” of the **flow** of Time is not. It does *not* resemble the speed of light (the car above) in **condensed matter**. For example, in diamonds with refractive index **2.42**, the speed of light will slow down to 1.25×10^8 m/s.

Our case is about the **flow** of Time. Quote from p. 5 in [text.pdf](#): we can always pick a reference frame at which a system is ‘**at rest**’, and in this sense it does not “consume” space, as depicted in Fig. 1 below. But the **flow** of Time will not perish: it will keep running. But with what “speed” or “rate”? 1 sec/sec makes no sense. Physicists (e.g., [W.G. Unruh](#)) have *no idea* what phenomenon could “deflate” the **flow** of Time and create **attractive** gravity (Fig. 2).



Fig. 1

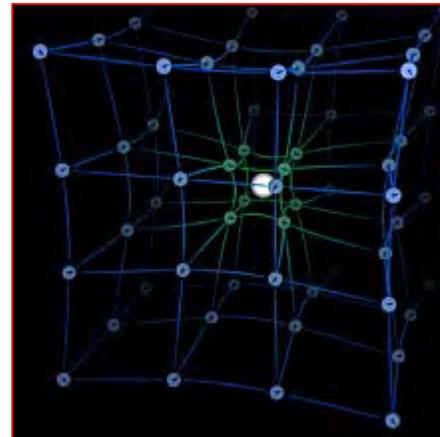


Fig. 2

Ditto to *repulsive* gravity created by “inflated” **flow** of Time. For example, in the case of *Dipole Repeller*, “the structure of the flow exhibits a pattern of repulsion and attraction” (D. Pomarède, [01:03](#)).

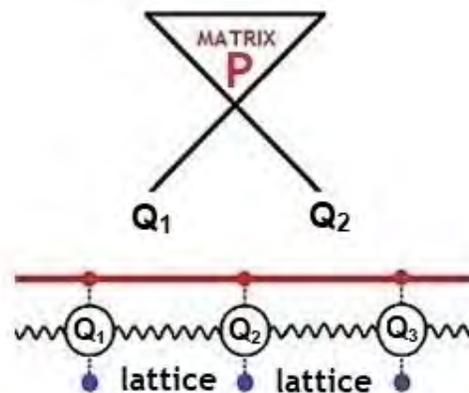
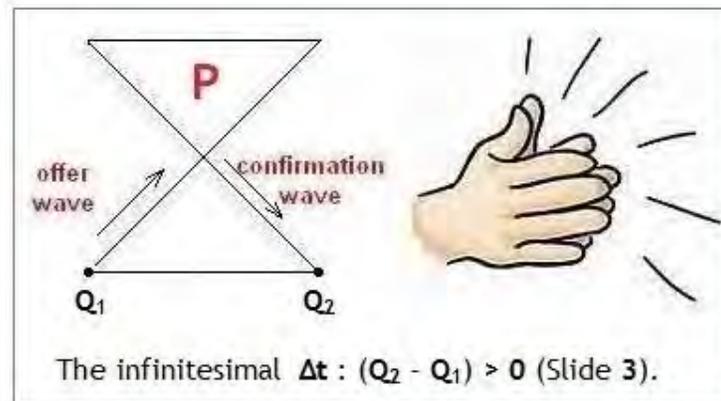
We go even further by suggesting a dynamical, **tug-of-war equilibrium** of the manifestations of gravity, attractive and repulsive, which shapes the cosmos. This is the *local* tug-of-war gravity, which emerges due to **the global gravity**.

The so-called “**dark energy**”, “**dark matter**”, and “**black holes**” do not exist. Again, we need **unlimited clean energy** (p. 4 in [text.pdf](#)). Time is **running out**. Watch an illustration of the Fifth Force [here](#) and read again **RS spacetime**.

If you disagree with **the arrow of Time** (p. 2), try to unite the *asymmetry* of 4D spacetime from the phenomenon of **causality** with the principle of **locality**. The **car** at p. 7 only “admits” (D. Pollack *et al.*) an “engine” (p. 3), but *where* is it?

And *what* is this “engine” (B2)? You can’t somehow insert **thermodynamics** in **spacetime topology**, so that “thermodynamics will smoothly determine future directions in the whole universe”, as speculated by R.K. Sachs and H. Wu in *General Relativity for Mathematicians*, 1977, p. 27 (p. 7 in [Heraclitus.pdf](#)).

You can't suggest any *physical engine* (B1), not to mention some almighty creature like *Jehovah* or *Allāh* (p. 19 in [talk.pdf](#)). My solution to the puzzle is explained in C1 at [p. 4](#) and at p. 15 in [talk.pdf](#). Read a section from [Slide 1](#):



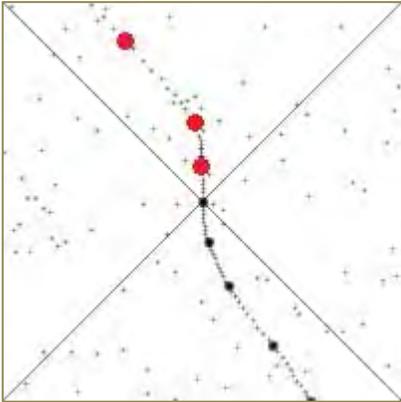
$(Q_1, Q_2, Q_3, \dots, Q_n, \dots)$ are in the *irreversible past*.

The *wavy line* in the lattice is the *ambient* infinite-dimensional Euclidean space or 'canvas' explained at [p. 5](#). It creates *wave-like* propagation of *Fifth Force* (e.g., in your [brain](#)), rooted on the *Unmoved Mover*. Notice that every 4D event 'here and now', denoted **Q** in the drawings above, follows the **next** one in line with the principle of *locality*. As to *spacetime engineering*, the **matrix** (p. 7 in [video.pdf](#)) may connect and correlate space-like separated events (*H.P. Stapp*) as well, in which case we could fly on a *quasi-local trajectory*, like a 'gimbal'. If you disagree, try first to explain the *quasi-local* path known since 1911 [here](#).

Outline of Part 1 and Part 2 of *The Fifth Force: Proof of Concept*, recorded in my home video studio. Part 3 is expected to contain the confirmation of the experiments in Part 2, issued by some technical laboratory in [December 2022](#).

1. The Fifth Force ([text.pdf](#), [talk.pdf](#), [history.pdf](#), and [video.pdf](#)) in spacetime engineering (15 January 2020) explores the [arrow of Time](#) ([Heraclitus.pdf](#)). In [February 2020](#), I had five experimental confirmations. Now I have many more.

1.1. How can we explore the arrow of Time? By tweaking the forthcoming, not-yet physicalized **Platonic** state (“**carrot**”) inhabiting the potential **future**:



Tweaking the **future**, not-yet physicalized **Platonic** state (“**carrot**”), depicted here with **red** dots, does *not* require transfer of energy on behalf of the operator: the task is essentially tweaking the **complex phase** of the wave-like **Platonic** state. Yet the entire process is not completely effortless. Try the experiment with **your brain** and recall the **two modes** of 4+0 D spacetime.

In one sentence, the **Platonic** form of reality – “just in the middle between possibility and reality” ([Werner Heisenberg](#)) – is the **origin of gravity** as well, presented as wave-like **Platonic** gravitational state in Fig. A and Fig. B [below](#).

1.2. Origin of the Fifth Force (B4): **re**-physicalized “**negative mass**” (Fig. B).

1.2.1. The physical system, depicted in the drawing above with black dots shifted in the irreversible past, becomes “animated”, as illustrated with the “self-acting” kitchen glove (p. 2 in [text.pdf](#)). The physical system acquires new holistic behavior: could it be **holomovement** and EPR-like **entanglement**? How about the **quasi-local trajectory** (Fig. C)? The questions require experimental research at a modern technical laboratory. We don’t have any theory of *direct* macroscopic manifestation of **the quantum spacetime** (not Chinese “**magic**”).

1.2.2. The physical system can gain or lose energy-momentum and angular momentum due to the Fifth Force: watch the experiment with **solar radiometer** in Part 2. Illustration in [ball.mp4](#): notice the distinctive pattern of what people call “**dark energy**”. Is the **energy from gravity** **re**-physicalized “**negative mass**”?

Too many questions with no clear answers. Let’s move on, **time is running out!**

2. Experiments

2.1. Consider a small ball on a table. The ball is **at rest** with respect to the table, so it will not “consume” space. But the **flow of Time** will not perish: it will keep running (p. 5 in [text.pdf](#)) thanks to the Fifth Force (B1). There is a **fundamental shift** (Fig. B) along a new axis **W**, which is *completely* “collapsed” in the physical 4D spacetime pictured previously with the flattened **lily**. The ball is made exclusively from the positive mass (B4) that is being dynamically **re-balanced** (Fig. A) in its potential **future** (Sec. 1.1) by its *not-yet* physicalized counterpart there. The latter is not **negative mass** per se. With light, we can’t observe “**negative mass**”. It is an artifact of the **wrong ideas** in current physics.

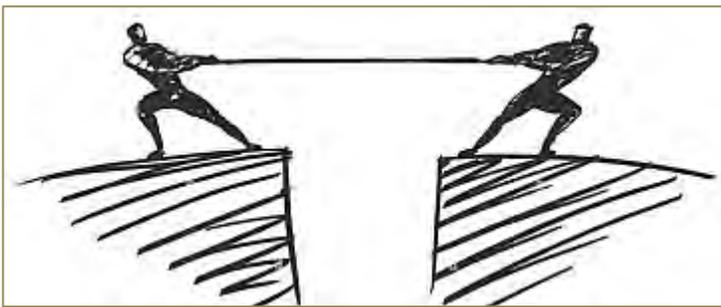


Fig. A



Re-physicalized “**negative mass**” (B4)

Fig. B

The potential **future** harbors only the **Platonic propensities** (“**carrot**”) for the next consecutive future state, “before” it passes via the 4D instant ‘here and now’ and becomes *physical* reality as ‘facts’ in the irreversible past (Sec. 1.1). In order to inject the Fifth Force into the ball and propel the ball by **self-acting propellantless propulsion**, we have to *tweak* its **Platonic propensities** (“**carrot**”) and design a new state of the ball in which it will “suddenly” acquire additional kinetic energy (Fig. B): watch the second part of [ball.mp4](#). Ditto to injecting kinetic energy and angular momentum in our **solar radiometer** (Sec. 1.2.2). But *how* (R3)? And *where*? Directly in the fundamental **quantum spacetime** (Fig. C). It is the **Platonic “trunk”** right above **your neck** (p. 3 in [talk.pdf](#)).

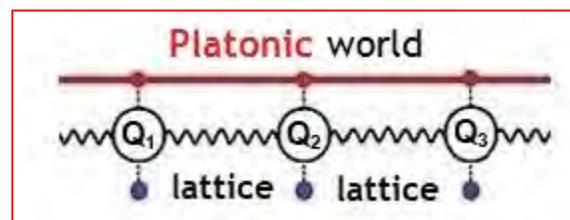


Fig. C

Read p. 2, C1 at p. 4, p. 15 in [talk.pdf](#), and p. 3 in [text.pdf](#).

To fully understand the **Platonic** world (Fig. C) in 4+0 D spacetime, read closely [two_modes.jpg](#) and Sec. 1.1 [above](#), and my postings [here](#) and [here](#). Click Fig. A [above](#) and read p. 5 in [history.pdf](#). More from Banesh Hoffmann ([Hoffmann.rar](#)), Guang-Jiong Ni ([physics/0308038](#)), Friedwardt Winterberg ([arXiv:0805.3184](#)), and Robert Forward (Eq. 3 in *Negative Matter Propulsion*).

In addition, it requires no energy to make the marvelous negative matter ball to run our miraculous negative matter propulsion system. As long as we generate positive and negative matter in equal amounts during our fabrication process, the total energy needed to provide the rest mass for the combined system is zero

$$(+M)c^2 + (-M)c^2 = 0 \quad (3)$$

because the negative matter ball has negative rest mass energy.

Eq. 3 above is the precursor to the so-called *evolution equation* (8 November 2015), explained at p. 28 (last) in *The Physics of Life* ([Intro.pdf](#)). The “negative matter ball” (Robert Forward) is nothing but the **Fifth Force** in Fig. B. This is low-energy **propellantless propulsion**. Read NB at p. 6 and my proposal at p. 2. I propose unique modifications of **quantum theory** and the **theory of relativity**. In practical terms, the experiment with the **solar radiometer** (Sec. 1.2.2) could pave the way to brain-enhanced **nanotechnology** and **biotechnology**. And [more](#).

Or perhaps you prefer **Kip Thorne’s pink unicorns** dancing with **red fat herrings**? Or “**bus levitation**” with Chinese “**magic**”? Or “**dark energy**” as a **physical force**?

Needless to say, **all experiments** must be reproduced at a technical lab in **December 2022**. The issue at stake is **clean and unlimited energy**: read the report by UN Climate Change from **26 October 2022**. Thirty-three years ago, on 31 October 1989, I completed my first report ‘*How To Bind Mind To Matter?*’. Nobody from the established theoretical physics community responded so far.

Don’t procrastinate, the **climate change** will be severe. The average global temperature on Earth has increased by **at least 1.1° Celsius** since 1880. The European region has on average seen temperatures rise **0.5 degrees Celsius each decade** since 1991. If we do not reverse this suicidal trend **now**, by 2030 the threshold of **1.5 degrees Celsius** will be trespassed. **Time is running out!**

D. Chakalov

<http://chakalov.net/#global>

8 October 2022

Last update: 13 November 2022, 19:15 GMT

Winners don't quit and quitters don't win.

What if gravity isn't a fundamental force?

Gravity is one of the manifestations of *the* fundamental force of Time, called the **Fifth Force**. It (not “He”) underlies *all* four forces mentioned in [textbooks](#), like a ‘glove’ with an **invisible ‘hand’ inside** (p. 18 in [talk.pdf](#)). People suggest that all objects with mass have a gravitational field around them: what we call ‘gravitational field’ is “**where a mass experiences a force**”; simple illustrations in general relativity at [YouTube](#) and by [Dianna Cowern](#) and [Arvin Ash](#) (11:16).

But how gravity (p. 9 in [text.pdf](#)) *rotates* the Earth *and* pulls up↑ rocks (p. 1)?

To tackle this questions, first we should try to understand whether gravity can be reduced to ‘something else’. **Tough question**. For example, we can *explain* ‘heat’ by reducing it ‘something else’, such as **kinetic energy**. If you drink a hot coffee, you wouldn't try to explain its temperature with some very *hot* coffee particles in it. Also the ‘force of touch’ ([R. Muller](#)) in hitting a ball with a stick ([ball.mp4](#)): it may be fundamental to classical physics, but can be reduced to ‘something else’, so the ‘force of touch’ is not a fundamental one. Yet the ball also experiences *the* fundamental force of Time ([Sec. 1.2.2](#)): the **Fifth Force**. Ditto to your **brain** (pp. 2-3 in [video.pdf](#) and p. 2 in [homeostasis.pdf](#)).

To *explain* gravity, first we have to explain the *emergence* of Time: read C.J. Isham and J. Butterfield in [gr-qc/9901024](#). Then comes the *rate* of Time (p. 7) in Relative Scale (RS) spacetime (pp. 5-6 in [RS.pdf](#)). Any other suggestions?

Perhaps people are reluctant to endorse **spacetime engineering**, because they fear that it may lead to a new and highly **disruptive technology**. But we can and will implement it gradually, like **typewriters** were replaced by word processors and printers. We need the Fifth Force (p. 12). We are on ‘**the highway to Hell**’. **Time is running out!**

D. Chakalov

<http://chakalov.net/#reports>

Addendum

Let me offer a brief note to [Relative Scale \(RS\) spacetime](#) (pp. 5-6 in [RS.pdf](#)):

In *their* RS reference frames, protons and galaxies are 'the same'.

NB: This is how **Nature** RS-inflates and RS-deflates the invariant "meters of light-travel time". Why? In order to keep the "speed" of light everywhere and always RS-constant. It is all relative, as uncle Albert used to say. The origin of attractive gravity is RS-deflated spacetime *locally*, and the origin of repulsive gravity is RS-inflated spacetime *locally*. Forget "dark energy".

To keep the speed of light invariant *and* reject (Sic!) the idea of spacetime "curvature" (watch [Arvin Ash](#) and see Fig. D from 11:25), I introduced the RS-invariant spacetime intervals with **flexible** speed of Time (Fig. E and Fig. F).

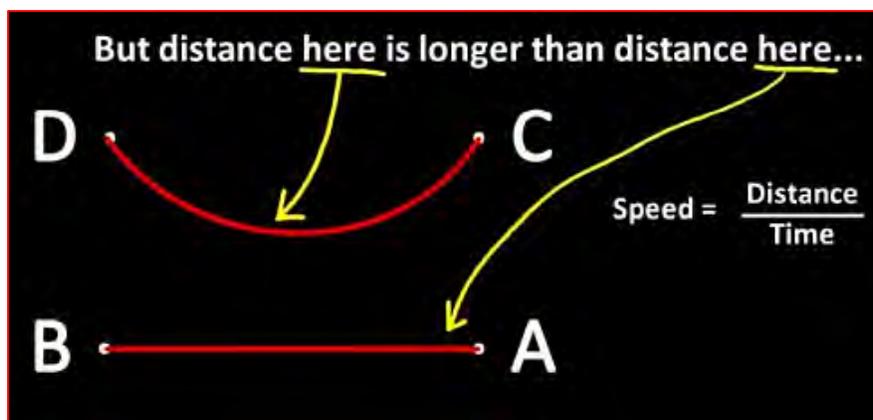


Fig. D

A smaller zipped interval assembled with lower *speed* of Time is like a greater zipped interval assembled with a greater *speed* of Time (Fig. E, p. 2 in [RS.pdf](#)).

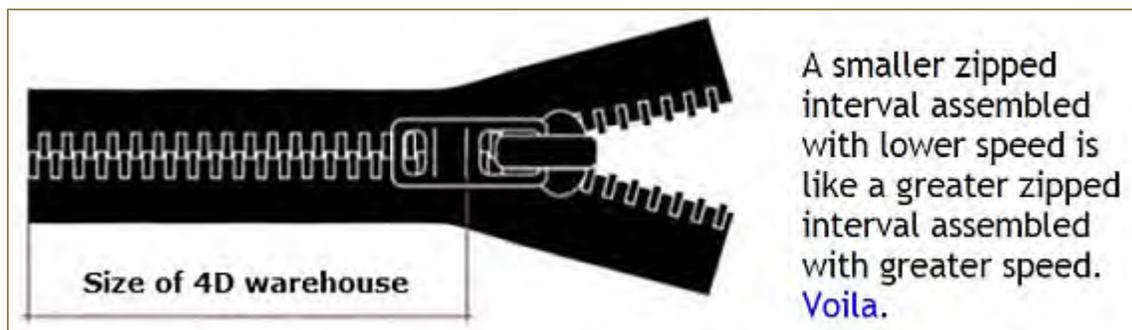


Fig. E. Compared it to Fig. F.

To illustrate how the RS-invariant intervals are dynamically ‘assembled’ with the **flexible** speed of Time, think of assembling three video clips with **flexible frame rates** (FPS): “Gravity *is* the unequable flow of time from place to place” (W. Unruh). Consider three film reels, called Bob, Alice, and Carol (Fig. F), with different numbers of frames: Bob is made of 10 frames, Alice of 20, and Carol of 40. Relative to Alice, Bob is twice smaller and Carol is twice larger.

Bob is assembled with 10 FPS
 Alice is assembled with 20 FPS
 Carol is assembled with 40 FPS

Fig. F. To fly like a **gimbal**, read p. 6 in **text.pdf**.

The speed of light will trespass the three RS-invariant spacetime intervals for *the same 1s of its light-time* due to the **flexible** speed of Time, as illustrated with 10 FPS, 20 FPS, and 40 FPS in Fig. F. In Alice’s RS-reference frame, 20 FPS will ‘assemble’ (Fig. E) an RS-invariant spacetime interval with RS-length **1sec**. In Bob’s RS-reference frame, *less* FPS will ‘assemble’ the RS-size of the **proton**. In Carol’s RS-reference frame, *more* FPS will ‘assemble’ the RS-size of a **galaxy**. Relative to the macroscopic world of Alice, Bob is RS-small and Carol RS-large. True. Yet in *their* RS-frames, they all will consume *the same 1s of light-time*.

Also, if you look at DC in Fig. D, you may imagine some “spacetime curvature”, correct? False. Look at Fig. G: there is no “curvature” at all. None (W. Unruh).

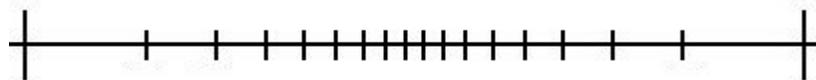


Fig. G

But how about the **gravitational lensing**? It suggests “spacetime curvature” in bending the light, correct? False. The path of light is just *distorted* (Fig. G). And if gravity-and-rotation (the tug-of-war gravity, p. 8) is a **bundle**, we can expect to observe *distorted* paths of light due to **geometric Coriolis effect**.

what *is* Dark Matter?



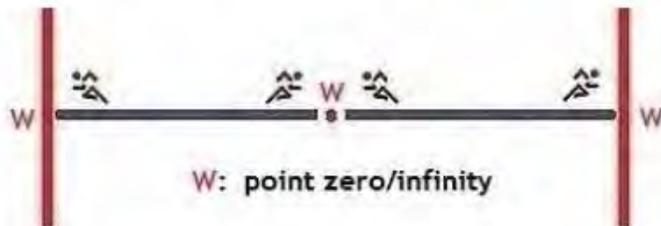
Fig. H. Read about **Fritz Zwicky and Vera Rubin**.

Perhaps **we can fly** on a **quasi-local** trajectory, like a **gimbal** (p. 6 in **text.pdf**) ?

But how? Is it [difficult](#)? It is like learning to juggle three balls (p. 3 in [text.pdf](#)).

Recall the “location” of the [atemporal Platonic](#) world (the [global mode](#) of spacetime) at p. 2 [above](#). Here’s the full excerpt from p. 19 (last) in [talk.pdf](#):

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).



The Universe is like an unbroken ring with no circumference, for the circumference [W](#) is nowhere and the center [W](#) is [everywhere](#).

The distance from a point *to itself* is *exactly zero*: “Intuitively, it never costs anything to travel from a point to itself” ([Wikipedia](#)). Intuitively, the [Platonic](#) world is *exactly* located *simultaneously* at each and every point ‘here and now’ in the 4D lily (p. 2), along the [nullified](#) axis [W](#). This is the [Quantum Spacetime](#). If “elevated” (pardon my French) in the macroscopic world at the length scale of tables and chairs, it will [correlate](#) all the [biological structures](#), creating the physics of Life (Erwin Schrödinger in [video.pdf](#) and [homeostasis.pdf](#)). Once we include an [RS-distant](#) object ([R3](#)) into our [potential](#) future (“[carrot](#)”), we will be dealing with *two* types of distances: physical and [Platonic](#). The former one is in the physical spacetime of the 4D lily endowed with metric (p. 2), whereas the latter is *exactly zero*. I trust this sounds familiar (pp. 21-31 in [SE.pdf](#)).

NB: You can learn [spacetime engineering](#) in two weeks or less, depending on your motivation (p. 2 in [text.pdf](#)). It is tricky but perfectly doable: read closely [Sec. 1.2](#). To find out if you can qualify, try the experiments [here](#) and [here](#).

Again, if nobody replies by the end of November (p. 5), I will have to [go public](#). I will lose my privacy and may have [tons of complications](#), but if this turns out to be *the only way* to find some technical lab and reproduce my experiments under [tightly controlled conditions](#), I will do it. We must save our planet from the [climate crisis](#). We are on ‘[the highway to Hell](#)’. [Time is running out!](#)

Perhaps there are many people that oppose any new energy sources to avoid crashing the oil market ([Rachel Maddow](#)), but this is a different thread. I really don’t want to jump from a window or get hit by a truck, whichever comes first.

Über die Geschwindigkeit von Licht und Zeit

Finally, I can entitle (in German) this report, and explain the [main ideas](#) in it.

Vloggers like [Hossi](#) and [Don](#) claim that, given the negative result of the famous [Michelson-Morley experiment](#), the luminiferous Ether – the *atemporal* medium that permeates the entire 4D spacetime *en bloc* and carries the light waves – does not exist as a *physical* (Sic!) stuff. Correct ([p. 3](#)). The luminiferous Ether must not exist at the level of spacetime manifold ([p. 5](#)). It must be *completely* deleted in [GR textbooks](#) from the outset ([R. Geroch](#)): any *physical* presence of luminiferous Ether and/or the Newtonian ‘vacuum’ ([p. 1](#)) will *demolish* the theory of relativity by exposing a *physical absolute spacetime* in which the banks of Heraclitus’ river (*Panta rhei*, p. 6 in [history.pdf](#)) will be at rest.

Thus, the [arrow of causality](#) must be *perfectly* hidden by the non-relational and omnidirectional “speed” of Light-and-Time. Notice that any *physical* motion is necessarily relational *and* unidirectional; e.g., if you are located at the equator and wish to travel north, you cannot at *the same time* travel south and simultaneously east and west, like the story about the ancient god [Janus](#). This is how the Light-and-Time operate in their *atemporal pre-geometric* Ether ([Albert Einstein](#)) placed in the [global mode](#) of spacetime, and the quantization of the local mode (the [lily](#)) is introduced from the outset (Fig. C at [p. 11](#)). Only the math of the [arrow of causality](#) (B1-B4) is still unknown: read [p. 2 above](#).

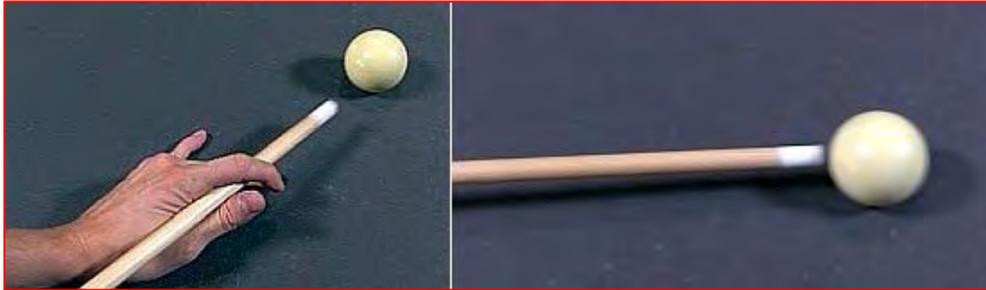
Also, notice how the fake “curvature” of spacetime ([Fig. D](#)) is replaced with real *distorted* spacetime intervals in [Fig. G](#). To preserve the “speed” of Light [invariant](#) to all observers in the local (physical) mode of spacetime (the [lily](#)), the *rate* of Time ([Fig. F](#)) must *locally* ‘slow down’ ([W.G. Unruh](#)). In this sense, the attractive form of gravity will locally “deflate” the metric in [Fig. G](#), and the repulsive form of gravity ([p. 8](#)) will locally “inflate” the metric. [Voila](#).

As to [spacetime engineering](#) ([p. 15](#) and [p. 13](#)), first you will learn how to “[see](#)” [everything](#) in the 4D lily ([p. 2](#)) from *all directions* ([p. 9](#) in [talk.pdf](#)). [Good luck](#).

28 November 2022, 12:52 GMT

The Origin of Gravity

The fundamental force of Time, called the [Fifth Force](#) (p. 13), always has two components embedded in the [matrix](#) (p. 7 in [video.pdf](#)). These components are depicted symbolically in the drawing below as the decisions about (i) *where* to direct the Fifth Force, and (ii) *what* must be its magnitude: watch [ball.mp4](#).



In the case of the [human brain](#) (p. 5 in [Intro.pdf](#)), the two components of the [matrix](#) (p. 7 in [video.pdf](#); see also p. 9 and Fig. 4 in [SE.pdf](#)) are embedded in what we call “nose” in the doctrine of *trialism* (p. 3 in [talk.pdf](#)). The quantum world ([Werner Heisenberg](#)) is also governed by the [matrix](#) ([Sec. 1.1](#)), but there is no mental influence (“arm”, p. 3 in [talk.pdf](#)) on the two components of the [matrix](#): the Fifth Force is not ‘[res cogitans](#)’. We need a new [quantum gravity](#): the “[semi-classical](#)” approximation cannot include the quantum-gravitational vacuum ([B4](#)). Read p. 2 [above](#) and p. 9 in [text.pdf](#) (excerpt below).

Again, the *source* of gravity (“timber”), which is placed in the right-hand side at [Einstein’s field equations](#), is *not* gravity (“marble”): [MTW p. 467](#).

$$\underbrace{R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R}_{\text{Marble}} = \underbrace{\kappa T_{\mu\nu}}_{\text{Timber}}$$

The ‘timber’ has [stress-energy-momentum tensor](#), which obeys a [continuity equation](#), in line with the “conservation” of energy and momentum:

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

The ‘marble’ is a different animal. It *triggers* effects in the ‘timber’, but *not* because the ‘marble’ (gravity) is some [physical field](#). How? With the [gravitalized](#) fifth force (p. 2) of the [self-acting](#) ‘timber’ (p. 5).

Facts first. The spacetime metric is endowed with **elasticity** – it can both *deflate* (Fig. G) and *inflate*. But how gravity as *geometry* produces *work*? For comparison, read the current hypotheses on gravity by G.F.R. Ellis.

On 10 May 2020 (p. 25 in *Can Geometry Produce Work*), I kindly invited many physicists to send their answers to the following questions:

Consider two kitchen scales, A and B, on a table at rest, and two apples on them, with different weight, say, an apple with 200g on scale A, and an apple with 400g on scale B. How would you relate their “trajectories” in 4D spacetime to the non-tensorial **Christoffel symbols**, so that the former will produce different weight?

Obviously, the apple with weight 400g on scale B will (i) resist **acceleration** *harder* than the apple with weight 200g on scale A. Obviously, *something* called “**fictitious force**” is (ii) doing **work** by pressing simultaneously the scales A and B on the table.

Obviously, (i) = (ii). But what is the origin of gravity?
Please expand your answers to **Earth tides**.

The questions above do not include the unsolved issue of gravitational *rotation* (Richard Feynman). It has been quietly swept under the carpet ever since the inception of GR (MTW p. 467), and the experts are still in **denial**.

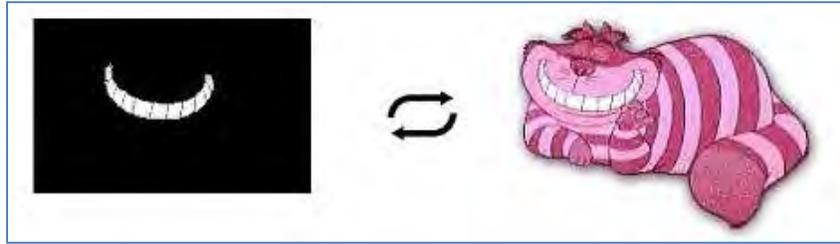
NB: Spacetime is geometry, but how geometry produces *work* on matter? Perhaps by **energy non-conservation**? But how the not-yet-physicalized **intangible energy** becomes ‘**tangible**’ one? Does it spring from the Ether?

On 5 May 1920, Albert Einstein explained the luminiferous Ether as follows: “But this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it.”

Perfect. Now we have a hint at the genuine **non-linear** gravity ². Replace the luminiferous Ether with the Platonic realm: “I want to know God’s thoughts; the rest are details” (Albert Einstein).

These ‘thoughts’ are delivered by **quantum gravity**. We want to harness the “**time field differentials**”. Here the “**time field**” is **gravitalized self-acting** matter and fields [Ref. 2]. The so-called **negative mass** is *not* physical stuff.

Let's start from scratch.



Symbolic presentation of *Einstein's equations*

Think of gravity as an adjective, say, 'blue'. You can't say 'this is a blue', without referring to some physical object, which is the "source" of the "adjective", e.g., 'this is a blue sky' or 'this is a blue flower', etc.

How is the gravitational energy associated with its source? Namely, how is the gravitational energy of the Cheshire cat *without* the cat (the left-hand side) associated with the same cat but *without* its bare geometric shape?

The only available hypothesis on gravitational radiation ¹ cannot answer the question above, as we know since the inception of General Relativity. The theory is *essentially* incomplete. It cannot explain how the spacetime could *act back* on matter by "telling it how to move" (MTW p. 5) – "there is no mutual action of gravitational fields *on* matter" (Hans Ohanian). According to GR (MTW p. 467), the *wegtransformierbar* gravity is *not* a 'natural force' (Zhaoyan Wu). It cannot explain even the Earth tides.

Take for example the neutron star merger at roughly 50 Mpc from Earth, detected on 17 August 2017: "A short gamma-ray burst was independently identified in the same sky area by the Fermi and INTEGRAL satellites for high energy astrophysics, which turned out to be associated (Sic! - D.C.) with the gravitational event (Elena Pian, *Front. Astron. Space Sci.*, 25 January 2021). But how is gravity *associated* with EM radiation? The first, and completely unsuccessful, effort to explain the puzzle was by Gunnar Nordström in 1914.

Nobody can claim that GW150914 has "confirmed" *anything*. We just don't know how gravity works; for example, how gravity *transports* mass-energy by EM radiation, such as the gamma-ray burst detected on 17 August 2017. The *linearized approximation* of gravity is for the birds. What if the *non-linear* gravity can transport *force-and-spin* as well ² ?

Forget “[semiclassical gravity](#)”. We need the genuine [quantum gravity](#). Read about the necessary and *sufficient* components of Time [here](#).

[D. Chakalov](#)

10 August 2022

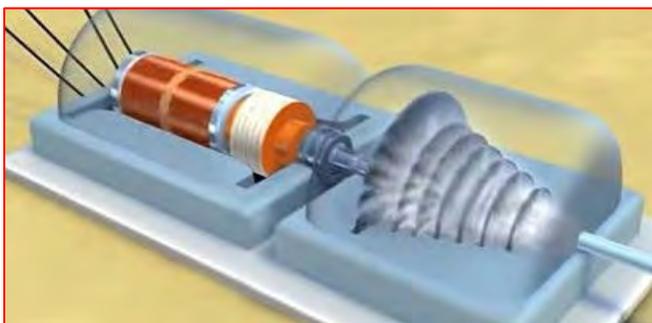
Latest version: 18 November 2022, 22:52 GMT

1. Thomas Mädler and Jeffrey Winicour (2016), Bondi-Sachs Formalism. *Scholarpedia*, 11(12):33528, [revision #196873](#).

2. In the quantum-gravitational world, every event ‘here and now’ is jointly determined by its history fixed as a ‘fact’ and by its potential **future** in the form of *propensities* – “just in the middle between possibility and reality” ([W. Heisenberg](#)). The end result is the **self-acting fifth force**. We can see with *light* only the **self-acting** ‘glove’ in the past. The potential **future** is [Macavity](#). The **self-acting** ‘glove’ (the physical cat [above](#)) is *animated* by the **fifth force** and acquires an *additional energy-momentum* and **angular momentum**, thanks to which the Cheshire cat becomes *gravitalized self-acting* 4D ‘glove’.

NB: There is no generic “gravitational energy” nor “gravitational angular momentum”. Likewise, there is no “mental force” in [the self-acting brain](#). The force of Life is the **fifth force**. I believe the *non-linear* gravity can transport **force-and-spin** as well, by *directly* injecting it in the *right-hand* side (*Sic!*) of the symbolic equation at p. 20 [above](#). We can literally [save our planet](#).

My project is presented in [Proposal.rar](#). The alternative project called ‘**nuclear fusion**’ *cannot* operate “like a diesel engine” ([Mike Donaldson](#)) to produce net energy gain, firstly because it lacks the crucial **quantum tunneling**. Forget it.



No, you can’t replace the *forceless* quantum “apples” ([quantum tunneling](#)) with enormous pressure and immense temperature in classical “**oranges**”. No, you can’t reproduce the **stellar nucleosynthesis**. ITER is €22 B Titanic. Read [explanation.pdf](#) and [ITER.pdf](#).

Quantum gravity creates the *confining force* in [Sun’s plasma](#). It is **completely different** from the attractive force between planets. No, you can’t **fool Nature**.

We need quantum gravity ² to understand both the confining force in Sun's plasma and the formation and evolution of galaxies. The majority of mass in galaxies is made up of "dark matter" (p. 8): "galaxies could not have formed as they have, or rotate as they are seen to, unless they contain far more mass than can be directly observed" (Wikipedia). This is why debunking the alleged 'nuclear fusion' on Earth (p. 21) is crucially important. We need to unravel the quantum-gravitational fifth force ². Do not play poker with taxpayers' money.

If the Heraclitean Time in the quantum world is RS-deflated relative to Alice (Fig. F), she will consider it terribly "small" due to Heisenberg's $\Delta t \approx \hbar/\Delta E$, yet in the quantum world Δt is flexible and "large" enough to facilitate the quantum "apples" (p. 21) with the forceless quantum tunneling. Forget ITER. Read about the experimental test of the fifth force at p. 4 in text.pdf, and the two excerpts from *Spacetime Engineering 201* below.

7

Addendum 1

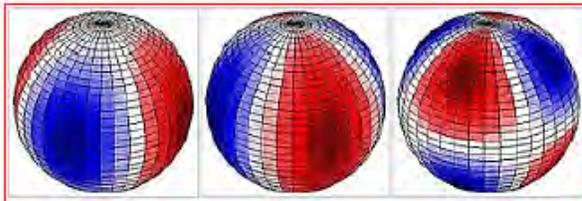
If you think of the fifth force (p. 6) as some physical field, you will have to call this new physical field "dark matter" and "dark energy" (Addendum 5), and speculate extensively about "black holes". Don't.



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.

To grasp intuitively the holistic fifth force (p. 4), think of Platonic hand embedded in its 4D glove, thanks to which the 'glove' becomes self-acting (p. 7 in the Notes, SE.pdf). It's not like Baron Munchausen. The Platonic hand does not act like an external physical force, but only through its 4D glove (e.g., the shoal of fish at p. 4), which is how the physical glove acts on itself by the universal holistic fifth force.

I am definitely certain that the majority of **theoretical physicists** do not endorse **GW parapsychology**. LIGO is *totally* useless, by its design, to detect the genuine gravitational radiation, because it cannot detect *any non-linear GW*. As LIGO “scientific” collaboration confessed, “a *vacuum* BBH merger does not produce any EM or particle emission whatsoever” (p. 9 in [arXiv:1602.08492v4](#)). Thus, LIGO can only try to “measure” a **vacuum ghost**. This is **GW parapsychology**. Proof: the “experts” at LIGO “scientific” collaboration have *no idea* how gravity produces work, for example, in **Earth tides**. They only **cry for money**.



If GWs transport energy, they will be *physical waves*; if GWs *cannot* transport energy, they will be some parapsychological ghosts. This is the dilemma in **GW parapsychology**.

The **Christoffel symbols** cannot rotate the Earth *and* pull up↑ rocks.

Back to the bare grin on the face of the Cheshire cat, but *without* the cat, depicted at the left-hand side of the symbolic equation at p. 20 [above](#). It corresponds to the so-called *empty waves*, which propagate in 4D spacetime, but do not carry energy or momentum and are not associated with any particle ([Wikipedia](#)). Read Franco Selleri’s “Gespensterfelder” in *The Wave-Particle Dualism*, Springer, 1984, pp. [101-128](#).

How about the “empty waves” called GWs? These *Gespensterfelder* do not transport energy or momentum, simply because they can’t. **Fact**. If they could, gravity would be a mundane physical field. No way ([Zhaoyan Wu](#)).

So, what are these gravitational *Gespensterfelder*? *Gespenstergravitons*. Read [Kip Thorne](#) on pp. 13-14 in *The Arrow of Spacetime* and his “experiment” [here](#).

The so-called **GW150914** has not “confirmed” *anything* (p. 20). Who will be the first to say that **GW150914** is a **FRAUD**? How about you, my dear reader (p. 3)?

Back to the origin of gravity (p. 18 and p. 21): we must get rid of all idiotic “dark” stuff (**B4**). No **parapsychology** is accepted, no matter how much math it contains. Let’s begin with the so-called “**nonbaryonic dark matter**”.

what *is* Dark Matter?



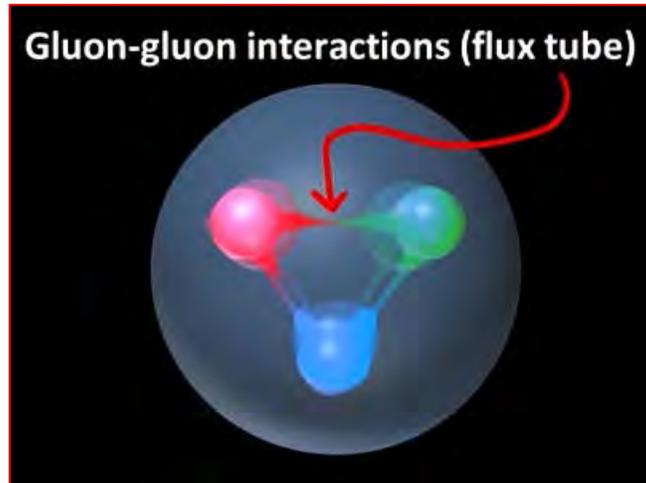
Fritz Zwicky



Vera Rubin

Why Does The Universe Look Like This? YouTube, [34:45](#).

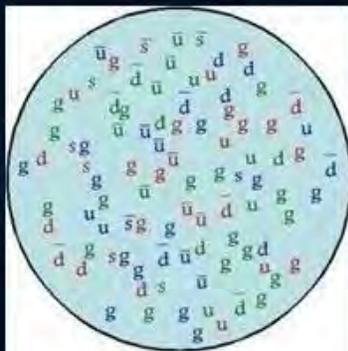
My [theory of gravity](#) (p. 8 and pp. 14-15) is surely speculative, because we do not know the origin of [mass-energy](#) and [angular momentum](#) from gravity, nor the quantum-mechanical origin of mass exhibited in the quark-gluon plasma. Bottom line is the *virtual* particles (“an unrealized possibility rather than an actuality”, [D. Valdano](#)) and the lack of quantum-gravitational [quasiparticles](#).



Arvin Ash, *Why does the SUN SHINE?* at [YouTube](#).

More from [Werner Heisenberg](#) below and at pp. 21-22 [above](#).

Atemporal Quantum Reality: Proton's Mass

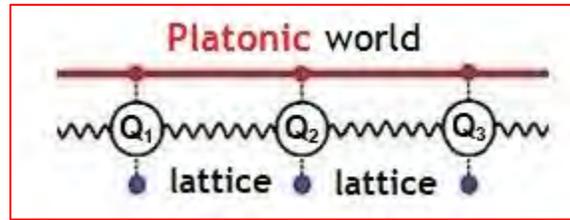


How about spin-2
Higgs-like boson
at 14 TeV?

Only about 1% of proton's mass can be traced to **quarks** (two up quarks and one down quark), whereas 99% of its mass belongs to Quantum Chromodynamics (QCD) binding energy. Imagine zillions of quarks (u,d,s), antiquarks (u,d,s with a bar on top), and gluons (g) zipping around near the speed of light, banging into each other, and appearing and disappearing from QCD vacuum (Strassler 2010): they are able to assemble proton's **mass** of $938 \text{ MeV}/c^2$ with error margin of just *one* part in 10^{45} (Dolgov 2012), for at least 10^{29} years.

What phenomenon could create 10^{82} **identical** protons?

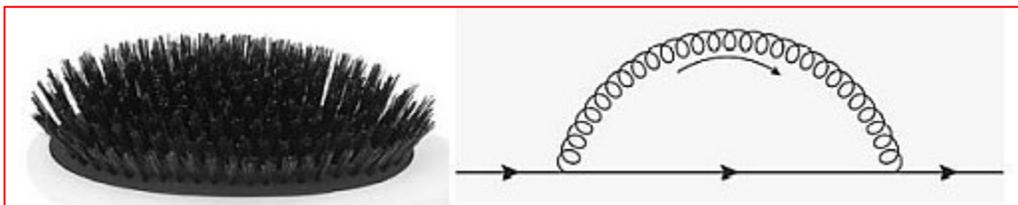
The Platonic **matrix** of proton's mass is not "dark", of course. But how can we describe mathematically the 'quark-like' quantum-gravitational objects that cannot be directly observed in *principle*? Enter the puzzle of [Macavity](#) and the challenge of [quasi-local 4+0 D spacetime](#) along the arrow of Time ([Slide 1](#)):



Mathematically, how can the **Platonic** world *physically disappear* like *Macavity*?

Because if the **Platonic** world was some *physical* stuff, one could, for example, speculate about *gravitational* stress-energy-momentum tensor that describes the positive-energy density and the local flux (**Sic!**) of “energy and momentum in spacetime” ([Wikipedia](#)). If true, gravity – the geometric cat *without* the cat (p. 20) – will be some mundane *physical field*, and the Born rule (delivered in a [footnote](#)) will refer to the probability density and flux of *physical* quantum waves. *Ausgeschlossen* ([Erwin Schrödinger](#)). The only way to ‘have our cake and eat it’ is by introducing the **self-acting** Fifth Force, which makes all quantum-gravitational (and *living*) systems **self-acting** (Sec. 1.1). But what is the math?

You may need a new *complexified fiber bundle* that is *exactly* nullified at the instant of observation, like *Macavity*. If you are good at topology, try a **Kähler manifold** with **Hermitian metric** vanishing *exactly* at $d\Omega = |\mathbf{w}|^2 = 0$. But notice that all “bristles” in the *fiber bundle* below are **virtual** quantum-gravitational interactions shown as *atemporal loops* in the *global mode* of spacetime (p. 4).



The base space here is *only* the 4D lily (p. 2), and the *atemporal loops* (p. 4) resemble Escher’s *drawing hands*. These *atemporal loops* are nothing but the *sphere-torus transitions*: read pp. 8-9 and pp. 12-14 in [talk.pdf](#). More at p. 5.

I stand ready to explain in details the mathematical challenge sketched above to mathematicians fluent in topology and differential geometry. In my opinion, we need in the first place the so-called *hyperimaginary number*: p. 6 in [RS.pdf](#) and Fig. 8 on p. 13 in [talk.pdf](#). As a bonus, we expect to model God ([John 1:1](#)) at the **sub-photon** level **W** “inside” null intervals (p. 19 in [talk.pdf](#)). **Good luck.**

To understand the physics of Light-and-Time (p. 17), recall the *displacement current* in the theory of electromagnetism by James Clerk Maxwell from 1865:

$$3. \quad \nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \quad 4. \quad \nabla \times \mathbf{H} = \frac{\partial \mathbf{D}}{\partial t} + \mathbf{J}$$

As Kip Ingram eloquently explained, the *partial derivative* of D with respect to time (as read with a clock) is known as the *displacement current* which, along with the other time derivative term in equation 3, enables the propagation of electromagnetic waves in the 4D lily (p. 2). But one cannot take derivatives of time with respect to Time (p. 4 in [Time.pdf](#)) to show the *rate* of time, like e.g. ‘frames per second’ (Fig. F). Which is why the *origin* of positive mass (watch a video by A. Ash about symmetry breaking at [YouTube](#)) is a *fundamental puzzle*.



The drawing above may be deceiving, because the omnidirectional and non-relational “speed” of Light (p. 17) does not allow us to “see” the underlying *atemporal* (p. 2) black background (p. 5). Which is why physicists like Robert Geroch deeply believe that the *arrow of causality* does not exist (p. 3). But then what is the *origin* of time in the *cosmological scale factor*? *Totally dark*. Like the dark medium surrounding the 4D “elevator” at p. 2. But dark ... *what* ?

Forget GR. As Max Planck remarked in 1936 (*The Philosophy of Physics*, p. 53):

An important scientific innovation rarely makes its way by gradually winning over and converting its opponents: it rarely happens that Saul becomes Paul. What does happen is that its opponents gradually die out and that the growing generation is familiarized with the idea from the beginning: another instance of the fact that the future lies with youth.

Cosmic Subtraction

100%±1% All Matter
-27%±2% Gravitationally Attractive Matter

73%±3% Mystery Matter!

And that leaves us with
73% mystery matter,

ANU
TV

▶ ▶▶ 🔊 40:56 / 49:05



THE FUTURE OF THE UNIVERSE SEEMS TO BE DARK ENERGY

The More Space Expands - the More Dark Energy
can push against gravity - Creating even more
space and more Dark Energy

leading to a runaway process.

ANU
TV

▶ ▶▶ 🔊 43:55 / 49:05



The accelerating Universe: Nobel Laureate Brian Schmidt (Aug 3, 2012)

<https://www.youtube.com/watch?v=55pcpTjd3BY>

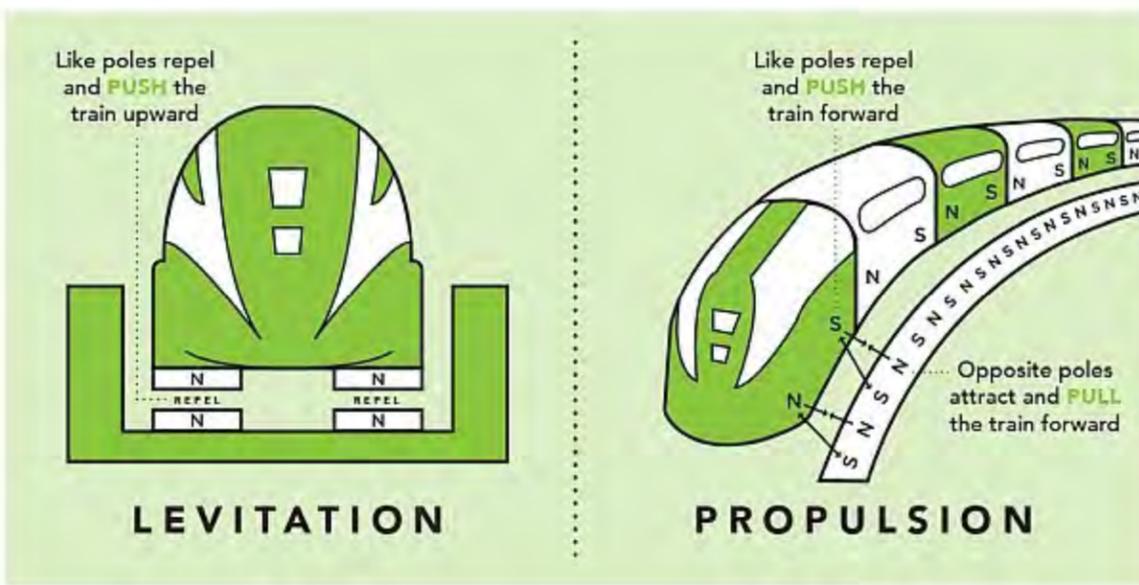
The "dynamical dark energy" is a perfect fluid, which "provides an all-pervading energy density and negative pressure that are the same to all observers, at all places, and at all times in the history of any universe model, even the expanding ones. (...) This fluid has zero inertial mass! It can be accelerated with no cost, no effort".

B. Schutz, GRAVITY from the Ground Up: An Introductory Guide to Gravity and General Relativity, Cambridge University Press, Cambridge, 2003, pp. 255-257.

What is green, lives underground, has one eye, and eats stones?
The green, underground, one-eyed, stone-eating Monster!

If you prove with meticulous scientific observations that the stones in your area have been disappearing, you may be awarded Nobel Prize in Physics as well. You only have to use math to "prove" that the green, one-eyed, and stone-eating Monster does exist. Of course, it cannot be directly observed, because it lives underground. Which is why it does not emit nor reflect light.

D. Chkalov
chkalov.net

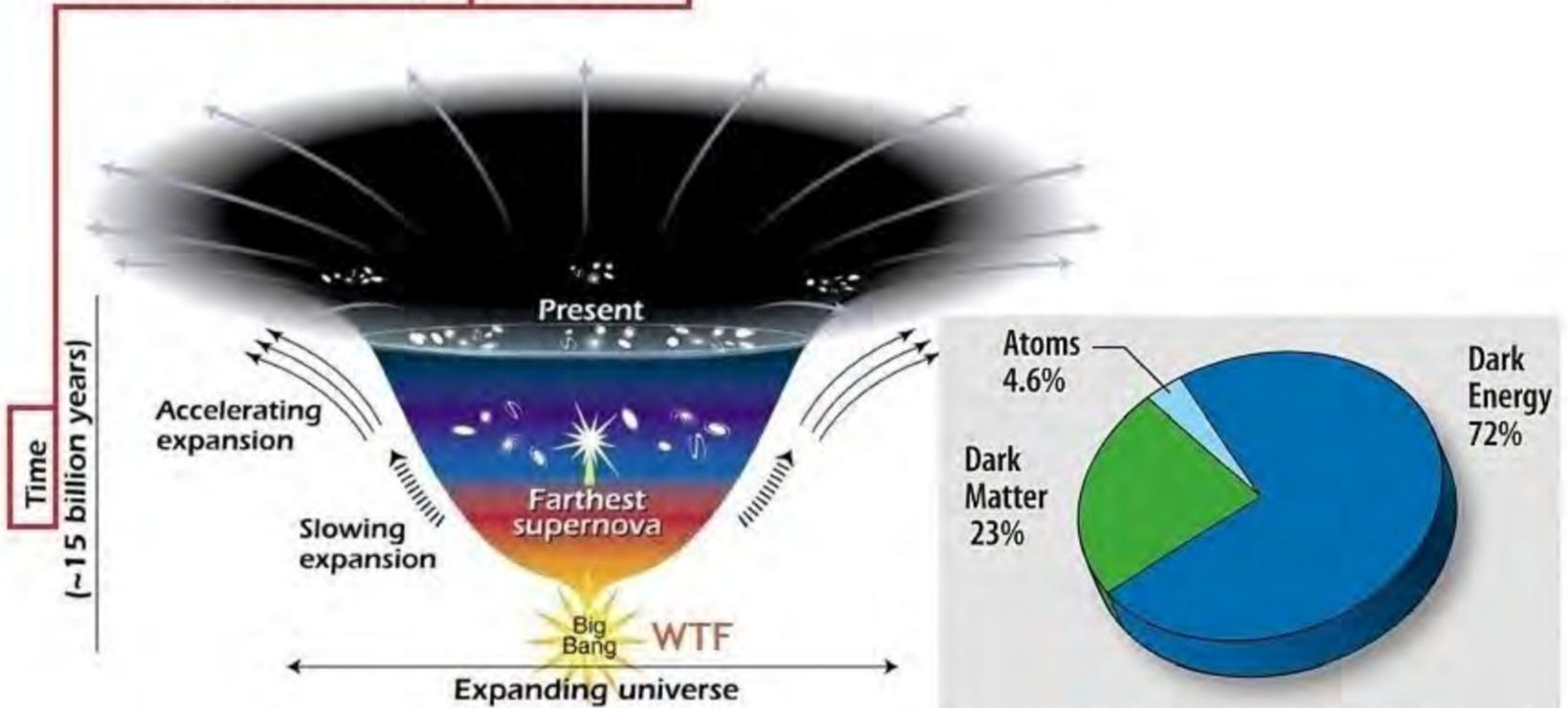


Analogy for "dark energy"



Analogy for "dark energy"

Detonating cord burning in **one direction.**



David Griffiths, *Introduction to Elementary Particles*, 2nd Edition. Wiley-VCH, 2008, p. 409.

12.3 Matter/Antimatter Asymmetry

Everyone assumes that the Big Bang created matter and antimatter in exactly equal amounts. If this is the case, how come we are surrounded by electrons, protons, and neutrons, with no positrons, antiprotons, or antineutrons in sight? Of course, if a positron (for example) *does* show its face, it doesn't last long: as soon as it encounters an electron, they annihilate. But this doesn't explain the preponderance of leftover electrons. Perhaps it's a local phenomenon – our matter-dominated corner of the universe is balanced by an antimatter region somewhere out there. However, there is no evidence for this – on the contrary, astrophysical observations indicate that the known universe, at least, is all matter (if there *were* an antimatter zone, the border would be an extremely violent place, and it is hard to imagine that the cosmic microwave background would show no sign of the disturbance) [12]. Alternatively, some process must have favored matter over antimatter in the course of cosmic evolution. What sort of mechanism might do the job?

(... during the Planck period of time, from point 0 to approximately 10^{-43} seconds. D.C.)

Here's the metric paradox by Yakov Zel'dovich: Long time ago, there was a brief period of time during which there was still no time at all. Only the Unmoved Mover (Aristotle) could do the job.