Gravitational energy: The wegtransformierbar elephant

Look at the drawing below: what do you see?

Obviously, this is an elephant walking on tight rope, only it fell off at the very instant you looked at it, just like Eliot’s cat *Macavity*. Which is why we can only *think* about “geodesic” (H. Ohanian and L. Szabados); details in *The Atemporal Platonic World*. Some explanation is obviously needed.

The ‘elephant’ here stands for the energy of gravity, that is, the energy from geometry: the grin on the face of Cheshire cat, but *without* the cat, as observed by *Alice*.

“Space acts on matter, telling it how to move. In turn, matter reacts back on space, telling it how to curve.”  
*J.A. Wheeler* in *Gravitation*, p. 5.

Thanks to the equivalence principle in GR (MTW p. 467), the influence of gravity can *always* be gauged away at any point. To quote *A. Afriat* and *E. Caccese*: “Vanishing is an important criterion: a complex whose components are *wegtransformierbar* cannot be physically real — one whose components all vanish cannot ‘coincide’ with one whose components don’t.”

But the two components don’t have to “coincide”. Instead, “both fluxes cancel, and thus leading to a vanishing ‘flux’, i.e., $t_{\mu\nu} = 0$.” (*M. Montesinos*). How could this happen? Because, to quote again *M. Montesinos*, “there is a *balance* (emphasis mine - D.C.) between the ‘content’ of energy and momentum densities and stress associated with the matter fields (...) and the ‘content’ of energy and momentum densities and stress associated with the gravitational field (...)

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with it (the ether would come back!).”

But what if the ‘balance’ (cf. Eq. 23 above) at \( t_{\mu\nu} = 0 \) is valid only for individual points from the (geodesic) rope above? Can we think of non-vanishing ‘flux’ over the entire ‘rope’? Let me reproduce the illustration with a football at p. 5 in *The Atemporal Platonic World*.

![Fig. A](image1.png) ![Fig. B](image2.png)

If the football is *gravitalized*, it can acquire “energy and momentum from the gravitational field” (H. Ohanian) and “the *intangible* energy of the gravitational field” (H. Bondi) will become perfectly ‘tangible’. For example, the football in Fig. A can gain energy-momentum, as shown in Fig. B, or lose it. Moreover, if we kick the football straight up in the air, we will expect at some point to stop raising upward and go down, and perhaps hit your head, like Newton’s apple falling from an apple tree. But if the football is *gravitalized*, it may continue to fly up in the air with *acceleration*, as if it were propelled by some mythical “dark energy” (p. 19 in Zenon, and Anomalous Aerial Vehicle at p. 16 in BCCP).

Briefly, the ‘balance’ (cf. Eq. 23 above) at \( t_{\mu\nu} = 0 \) is valid only for individual ‘jackets’ from the rope above, because at each and every individual point/jacket the total energy is exactly balanced — nullified and hence “conserved” — in the so-called ‘evolution equation’ (p. 4 in Zenon and p. 3 in BCCP). The quantum-gravitational ‘John’ is *wegtransformierbar* Platonic reality: at any consecutive instant from the observable metric time \( \tau \) (C. Rovelli), the intangible energy of the gravitational field (H. Bondi) is already *Sic!* converted into perfectly tangible, localizable positive energy in the right-hand side of EFE, and the Platonic state of gravity, dubbed ‘John’, is completely re-nullified — once-at-a-time \( \tau \), as read with a clock. This is ‘the new normal’ *gravitalized* state at which “the gravitational field delivers no energy or momentum to the nongravitational matter” *anymore* (H. Ohanian). Will do it again, at the next instant \( \tau \) viz. at the next ‘new normal’ *gravitalized* state. The general rule is very simple: the Platonic world is presented as ‘John’ in Schrödinger’s cat and with ‘zero’ in Macavity cat. In symbolic terms, \( 1 + 0 = 1 \): the probabilities for observing John’s jackets sum up exactly to 1, whereas the chance to observe ‘John’ itself is exactly zero, as with the *wegtransformierbar* elephant above.

The evolution equation (Eq. 1 at p. 3) models the ability of Nature to unleash unlimited positive mass in the physical world by *tweaking* the cancellation mechanism producing positive mass, ranging from “positive energy density of about \( 6 \times 10^{-10} \) joules per cubic meter” (J. Baez), or even much less, to \( 3 \times 10^{47} \) joules of energy in less than a minute, in gamma-ray bursts (GRBs). The upper bound (if any) on positive energy release is unknown, as nobody knows how much energy was needed to create the universe at The Beginning (John 1:1).
Point is, forget about ‘energy conservation’, even in a mundane geodesic (H. Ohanian). You cannot even dream of “energy conservation” to ban the monopole & dipole radiation, if any. Forget about GWs. Read p. 24 in BCCP, p. 13 in Zenon, and p. 6 (last) in How to Bind Matter to Matter.

More about ‘negative mass’ from G. Horowitz. Watch the explanation of the balance (not conservation) of energy by P. Steinhardt. Notice my proposal to harness the “anomalous” gravitational rotation in Fig. E at p. 18 in BCCP, and read p. 28 (last) therein.

One last word about “the intangible energy of the gravitational field” (H. Bondi). It is not physical reality placed in the right-hand side of EFE, but atemporal Platonian reality (see Escher’s drawing hands), quietly residing “just in the middle between possibility and reality” (W. Heisenberg). The atemporal negotiations between matter and geometry, depicted with Escher’s ‘drawing hands’ and the Cheshire cat above, cannot be presented with tensors. We need brand new, not-yet-squared quantum-gravitational waves: the gravitized ‘cat’ is acting on itself via its own atemporal Platonian not-yet-squared state. Geometry alone cannot act on matter: the bare grin of the cat, without the cat, cannot have “gravitational stress-energy tensor” (E. Curiel). Matter can only act on itself, like the human brain.

Thus, the intangible Platonian world is not-yet-squared (recall the squared spacetime interval $\Delta s^2$) yet physicalizable reality. It is available to be squared and “collapsed” into positive energy density in the physical world, by dropping there its 4D ‘jackets’ endowed with metric, once-at-a-time, as read with a clock: see below Fig. 3 in How to Bind Matter to Matter.

The idea of “negative mass” appears in physics textbooks only because the Heraclitean flow of 4D events is completely nullified in these textbooks: there can be no asymmetry between the irreversible past and the potential future in the squared invariant spacetime interval. Subsequently, there is no explanation of baryon asymmetry and the theory of baryogenesis sounds like a fairy tale (if not worse, like “anthropic principle”). The “negative mass” cannot be completely banned with effective “quantum inequalities” or “weak energy condition”. For if you invoke some timelike vector field or ‘time-orientability’, you’re applying “magic”.

How come nothing goes wrong? To quote A.D. Helfer, “why do not perturbations (which are always present) send the field cascading through these negative-energy states, with a corresponding release of positive-energy radiation? It is a matter of common experience that such effects do not occur, or at least not often, and therefore there must be some mechanism restricting the production of negative energy densities, their magnitudes, durations, or interactions with other matter. (...) The present results suggest that any attempt to understand the consequences of negative energy densities for gravity (Hawking evaporation; effect on singularity theorems, area theorem, positivity of Bondi and ADM energies) must take into account quantum measurement issues.”

You can’t argue with facts: read p. 6 in BCCP. As of today, however, the experts in GR are dead silent. Nobody knows how to unite the three types of mass — positive, negative, and imaginary — into not-yet-squared quantum-gravitational waves of atemporal Platonian world. The so-called evolution equation is still in symbolic form, pending the precise formulation of hyperimaginary numbers ($|w|^2 = 0$):

$$|w|^2 = |m|^2 + |m_i|^2$$  \hspace{1cm} (Eq. 1).
I still don’t know how the hypothetical not-yet-squared quantum-gravitational waves with hypercomplex phase could cancel each other, to cast their 4D remnant with positive energy. If the negative component $|m|^2$ in Eq. 1 and its positive counterpart $|m|^2$ can “runaway” (Robert Nemiroff) to create self-acting quantum-gravitational systems and living organisms, perhaps we can understand and explore the energy density of the vacuum. Qui vivra verra.

Now, my theory of the atemporal Platonic world as the origin of gravitational energy is falsifiable, and I will offer a prediction which, if confirmed, will ruin the entire theory. I will refer to the crucial statement about the “dynamics” (if any) of gravity in GR textbooks: the mutual negotiation of ‘space and mater’ (MTW p. 5). It can be determined at one instant only (pp. 14-15 in Zenon). If the gravitational energy could be defined at two pointwise instants, $m$ and $n$, fixing the beginning and the end of an invariant spacetime interval $[m, n]$, gravity will become a brand new physical field endowed with its own “gravitational stress-energy tensor” that will influence the stress-energy tensor of the football in Fig. A and Fig. B above.

Look at the wegtransformierbar elephant above. It is impossible in principle to observe the origin of gravity along a finite interval from the geodesic above. Denote two instants from the metric time $\tau$ (C. Rovelli) with $\tau_m$ and $\tau_n$, $n > m$, for example, $\tau_n - \tau_m = 1$ sec, as read with your clock. Can you present a case in which your clock will read all (infinitely many) pointwise instants (“elephants”) from the metric time $\tau$ within 1 sec? If you can show such case (read C.G. Torre), the atemporal Platonic world will have nothing to do with gravity, and I will eat my hat. Promise. However, gravity will become physical field, like the EM field, the metric will be frozen (not dynamical), and will define some brand new “background” spacetime of the non-linear negotiation of the Cheshire cat and its faceless grin above, and the non-linear bi-directional determination of Escher’s drawing hands.

Let me reproduce and explain Fig. 3 at p. 3 in How to Bind Matter to Matter. The atemporal non-squared Platonic world, called ‘It’, is quietly residing “just in the middle between possibility and reality” (W. Heisenberg), depicted with the ‘bridge’ in Fig. 3 below. It obeys the postulate of locality, magnified here with infinitesimal $dt = 1$cm as ‘quantum of action’ in the so-called ‘geodesic’ (K. Brown), and also shows the quantization of spacetime. The latter is perfect continuum of 4D events, because no physical stuff can be inserted “inside” the infinitesimal $dt$ — only the non-squared wegtransformierbar Platonic world ‘It’. Notice that the ‘bridge’ below is interpreted as pre-geometric and non-differentiable Platonic “glue” made by the entire Universe as ONE.

**Fig. 3**

NB: Forget tensors (p. 19 in Zenon). We need the atemporal Platonic world of non-squared quantum-gravitational waves and their fleeting “eigenstates”. We need new Mathematics.

Recall Albert Einstein: “I want to know God’s thoughts — the rest are mere details.” Replace ‘God’s thoughts’ with the atemporal Platonic world called ‘It’, and keep in mind that the chance to observe ‘It’ is exactly zero, as explained with the general rule at p. 2 above. This rule is crucially important, because the quantum state dubbed John is wegtransformierbar as well: read Erwin Schrödinger at p. 6 in BCCP. Last but not least, the wegtransformierbar atemporal Platonic world ‘It’ is conditio sine qua non for all living organisms, such as the self-acting human brain. Without ‘It’, you will be left with two idiotic options: either the brain above your neck is some “super computer” or a chunk of gray matter haunted by some parapsychological “ghost” (p. 1 in How to Bind Matter to Matter). The choice is yours.
To avoid misunderstandings, consider an experiment with the ‘intangible’ (H. Bondi) energy of your self-acting brain, demonstrating non-verbal processing of mental images (A. Paivio). 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 and the long hands is greater? In Clock A or in Clock B? To deliver the answer, your brain must do work. Not your mind or ‘stream of consciousness’. Your brain does the job. In GR parlance, you may claim that, before the experiment, your brain was in some ‘free falling’ state along a ‘geodesic’, but to deliver the answer your brain had to “deviate” from its “geodesic equation” by producing work on itself, by perfectly ‘tangible’ (H. Bondi) energy. No, you brain does not become “curved”. Not a bit. It is bootstrapped and EPR-like (H. Stapp) correlated by its own atemporal Platonic state — not by some “super computer” or by some parapsychological “ghost”. And yes, your atemporal Platonic state has ‘mental correlate’ or qualia, called mind, stream of consciousness, volition, etc. Read The Doctrine of Trialism.

To cut the long story short, notice that the Heraclitean arrow of events (Fig. 3 above) is based on two conditions: necessary condition (‘change in space’ as local or coordinate time) and sufficient condition (‘change of space’ pertaining to the global Platonic time), explained at pp. 3-4 in How to Bind Matter to Matter. The two conditions are blended like a Platonic “hand” in 4D “glove” (pp. 5-6 in Über die Substanz von Raum und Zeit). The Platonic “hand” must be wegtransformierbar as well, or else there could be some physical origin of the Heraclitean arrow of events viz. some physical phenomenon at absolute rest, being the ‘engine’ of the arrow of events. Instead, I suggest the atemporal Platonic world called ‘It’, and localizable quantum-gravitational ‘jackets’, like the Platonic “hand” in 4D “glove”.

If you are interested in life sciences, look at your prenatal brain below and keep in mind that soon it will grow with the rate of about 15 million nerve cells per hour, and later your brain will create roughly 1,000 trillion synaptic connections, so that now you can read and think. The situation with our ‘very early universe’ is very similar, because its initial conditions and well-posed boundary value conditions could not (Sic!) exist in the ‘very early’ “glove” below, and certainly not earlier at the Planck epoch, just 10^{-43} sec after The Beginning at time zero (John 1:1). Simple, isn’t it?

As Fred Hoyle remarked (C3 at p. 8 in Zenon), the random emergence of even the simplest cell matches the likelihood that a tornado sweeping through a junk-yard might assemble a Boeing 747 from the materials therein.

For the record: I suggested ‘atemporal quantum reality’ 33 years ago, on 5 February 1987, ensuing from the interpretation of QM by Henry Margenau from 1954, the transactional interpretation (TIQM), and the first off mystery in QM from 1911, thanks to Charles Wilson. Read p. 4 in Penrose-Norris Diagram, as well as R. Penrose and S. Weinberg.
Watch ‘Spacetime Engineering 101’ (app. 22 min, password protected), from 15 January 2020. To obtain the password, follow the instructions at pp. 2-3 in *Spacetime Engineering.* To understand how to harness the *atemporal Platonic world* ‘It’, see the metaphor below.

You only have to swing the carrot (*potential future*) toward your desired destination, and the *donkey* will carry you and the cart there. The principal question is how to develop feedback from the *atemporal Platonic* “carrot” and get empowered by ‘It’: follow the Law of Reversed Effort. There is no *physical* interaction between you and the *wegtransformierbar* ‘It’— you’ll only notice that your ability to perform *self-action* has *increased*. It’s not like Baron Münchhausen. Newton’s 3rd law is not valid here. Simple, no?

The main talking points are explained at pp. 4-5 in *The Atemporal Platonic World.* Take ‘It’ or leave it.

D. Chakalov
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**Questions and Answers**

Q1. Your theory is very dense and I can’t understand why I would need it.
A1. Read about learning to juggle three balls at p. 9 in *The Physics of Life*.

Q2. What do you mean by “causal field”?
A2. The hypothetical *causal field* is defined over the spectrum of all ‘potential states’ in the future, which *may or may not* be actualized. They represent the *flexibility* of your “carrot”. For example, if you have a glass of scotch with an ice ball in it, the chance to see the ice ball outside the gall is zero. Why? Because the ice ball is *fixed* macroscopic object: it either ‘is’ in the glass, or ‘is not’. Not so in QM: see the explanation of quantum tunneling effect at p. 4 in *Stellar Nucleosynthesis.* Physicists talk only about probabilities, but notice that the chance of your *prenatal brain* to evolve into its current state is FAPP zero, or at least *far less* than the chance for two nuclear submarines to collide in the ocean, as it happened in February 2009. You may call this phenomenon ‘synchronicity’, but this is just a label. We need to explain the *atemporal Platonic world* ‘It’. If we were dealing with *physical* reality, it should be located somewhere in the *light cone*, and we would have to deal with “tachyons”. Bad idea. I spent over two years studying tachyons, from 1984 to 1986, and finally realized that we need to dig much deeper: *atemporal quantum reality*, as suggested on 5 February 1987. The *atemporal Platonic world* does not live *anywhere* in the light cone. Instead, the light cone is immersed into the so-called causal field spanned along the hyperimaginary axis *W* (p. 27 in *BCCP*).

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7 February 2020, 13:31 GMT