The atemporal Platonic world

Do not introduce Killing vector field by hand (R. Penrose). Get professional and read T. Padmanabhan:

> Thus, for a single particle, the condition $\nabla mT^{mn} = 0$ is equivalent to a geodesic equation. As we have already seen, the geodesic equation is capable of encoding the effect of external gravitational field on a material particle and — in general — will not lead to any conservation law. It follows that the equation $\nabla mT^{mn} = 0$ describes the way material systems are influenced by external gravity and, of course, is not a conservation law either.

More from H. Bondi, H. Ohanian and L. Szabados, C. Rovelli, and J. Butterfield and C.J. Isham.

Thus, the geodesic hypothesis (read Alan Rendall here) is still a mystery, ever since the inception of GR. But instead of **solving** this mystery, the GR "experts" from LIGO wasted over **450 million EUR** for their LISA Pathfinder, only to **confirm** the existence of geodesic mystery, as known since the inception of GR.

Read p. 6 (last) in GW150914: Pink Unicorns Dancing with Red Herrings.

The fact mentioned by H. Ohanian "the standard form of a conservation law, $\partial T_v^{\mu} / \partial x^{\mu} = 0$, which shows that the gravitational field delivers no energy or momentum to the nongravitational matter" **ANYMORE**, is explained in my endnote therein. As I stressed previously, the *atemporal* **Platonic** world **cannot** have metric properties (C. Rovelli). If you decide to somehow eliminate the *atemporal* **Platonic** gravity, you will end up with a ***physical*** gravitational field, which guides (Sic!) the material particle along its timelike path. It will be like you order a pizza from the nearby restaurant (the *left-hand* side at EFE), and once it is delivered at your doorstep you bring *exactly* the same pizza in your kitchen (the *right-hand* side at EFE).

No way. Thus, the mathematical fact that GR "is consistent with the local conservation of energy and momentum" (Wikipedia) ***requires*** (not "implies") that GR is inherently **nonlocal** theory consistent with perpetual **non**conservation of energy and momentum. To quote Hermann Bondi, "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." Yes, "its location can in principle be found" — once-at-a-time denoted with **τ** (C. Rovelli). Nature creates *perfectly* localized and ***gravitalized*** stress-energy-momentum and angular momentum at every instant **τ** read with a clock, as the *atemporal* **Platonic** gravity delivers no energy-momentum to the nongravitational matter **ANYMORE**. Will do it again, at the *next* instant **τ** : see Fig. **3** at p. 3 in matter-matter.pdf and read p. 4 therein.

Check out again my endnote in H. Ohanian and L. Szabados. We need quantum gravity, based on the *atemporal* pregeometric **Platonic** world[1] (pp. 5-6 in colorless.pdf). **It** resembles the old Aether (p. 27 in zenon.pdf), but is placed infinitely far away "at null infinity": no *physical* object, including a light beam, could reach **It**, ever. Thus, **It** is physically unobservable *atemporal* pregeometric **Platonic** world, which (not "Who") wraps the *entire* physical world at actual/completed infinity, up to null- and spacelike infinity.

And now we can define the *entire* physical world as 'isolated system' that is isolated *from* **It**, … and ***by*** **It**. Read about **It** at p. 5 in zenon.pdf and notice the **radius** of the inflating balloon in Fig. **B** at p. 21 therein.

We have no choice but to define 'the *entire* physical world' ***relationally***, but in such way that its physical 4D spacetime can be immersed into 'something else' (C.J. Isham and J. Butterfield), called **It**. Otherwise we face the insoluble paradox of infinite regress, also known as 'turtles all the way down'. Needless to say, the **Platonic** world '**It**' is *pregeometric* entity residing "inside" every 4D geometric point/event *as well*.

NB: The spacetime manifold (Zenon manifold) includes the *pregeometric* Platonic **It** (denoted with **W**), which creates "some kind of boundary, or margin, which is not part of the space-time but that, somehow, it is accessible from within it" (José Senovilla). The *asymptotic* properties of the physical spacetime and fields can be investigated by studying **W** at 'finite infinity' (FI), as well as the *local* behavior of fields at **W**. This is the core proposal to the *topology* of 4D spacetime, in line with its structure and dynamics.

Plato suggested **It** many centuries ago. **It** is the sole option for quantum gravity. Don't use tensors to model the properties of gravity. We need *atemporal* **Platonic** quantum-gravitational waves and their *physicalized* "jackets". If you disagree[2], I will leave you in the company of S. Weinberg and R. Penrose.

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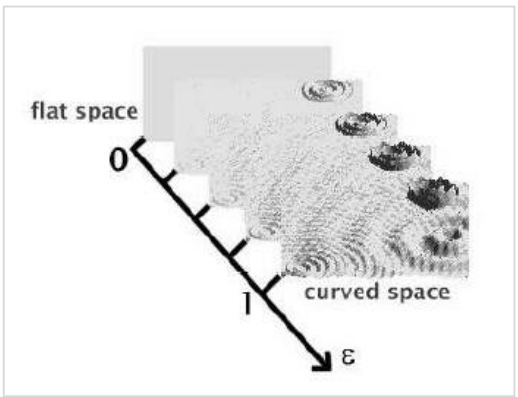
1. **It** is not some mythical "unphysical" spacetime manifold à la Penrose. **It** (not "He") is neither matter (*Res extensa*) nor mind (*Res cogitans*): read the doctrine of trialism at p. 25 in BCCP and in colorless.pdf. The Platonic **matrix** is presented as 'John' in Schrödinger's cat, and with a new kind of '**zero**' in Macavity cat. In symbolic terms, **1 + 0 = 1**: all "probabilities" for observing John's jackets sum up *exactly* to **1**, whereas the chance to observe 'John' as Platonic **matrix** is *exactly* **zero** (e.g., point **A** at p. 10 in BCCP). Read Erwin Schrödinger at p. 6 in BCCP and pp. 13-14 therein. Details at p. 6 in The Physics of Life and at p. 27 in BCCP. The entire Universe is non-relational **ONE** entity. **It** can be reached only with Mathematics.

Compare the Platonic theory of spacetime (read **NB** above) to the trick attempted by R. Penrose with some *unphysical* manifold that has *finite* hypersurface: see his Fig. 1. To understand the trick, recall that in calculus we always employ the *completed/actual* infinity, so we don't care about how *exactly* we obtain final results. Here's the old story about an *infinite* number of thirsty mathematicians entering a pub (p. 2 in Penrose_diagram.pdf). The first one says to the bartender: 'We all will drink from one glass,' and orders a pint. The second one orders a half pint, the third one a quarter pint... 'Got it,' says the bartender, and pours two pints. Clever story, but notice that all *spacetime points* from the glass holding two pints of beer are embedded in, and belong to the *larger* pub, which is why one can introduce **metric** and define a *finite* glass. R. Penrose, however, eliminated the pub and suggested a *finite* 'two pint' hypersurface "at infinity", which required some *unphysical* spacetime manifold "mapped" to Minkowski spacetime "at infinity". The asymptotic structure of Minkowski spacetime (G. Compere) is still mathematical jabberwocky. There can be no *physical* stuff "at infinity", in the first place. We need 'finite infinity' (FI): read above. Simply replace the alleged "non-geometric properties at the boundary of the unphysical spacetime" (G. Compere) with the *pregeometric* **Platonic** world '**It**': the entire *physicalized* world will be isolated *from* **It**, … and ***by*** **It**. Think of the latter as numerically finite yet *physically* unattainable **cutoff**, like absolute zero temperature. The *physicalized* 4D spacetime can only tend *asymptotically* toward its **cutoff**. No physical particle can actually reach **It** and inevitably **stop** (Sic!) there, neither "inside" the infinitesimal nor *exactly* "at infinity", because its state will be fundamentally **UN**decidable, like Thomson's lamp and 'John' in Schrödinger's cat.

2. Look at eq. (**7.6.1**) by S. Weinberg, in which "$\mathbf{h}_{\mu\nu}$ vanishes at infinity". What kind of "limit" is that? To illustrate this *effective* "limit", suppose you make BBQ at your backyard. It is a hot summer day and your air thermometer reads 28°C. You measure the temperature *very* close to your BBQ and the thermometer reads, say, 60°C. Then you walk away from the hot BBQ and notice that the air temperature decreases, until it reaches 28°C, at 5m from the BBQ, and at this point it **stops** there. You are "sufficiently" faraway, *exactly* 5m from the BBQ, and at this point the thermal effect from the BBQ is **zero**.

People like S. Weinberg and R. Penrose use the same *effective* "limit", only now "$\mathbf{h}_{\mu\nu}$ vanishes at infinity" at which "**Ω** = **0**" — not at *finite* distances, 5m from the BBQ or 'two pint beer', as in the examples above. In the misfortunate *linearized* approximation of GR (S. Weinberg), the "intuitively clear" parameter **ε** , shown in the first drawing below, simply *cannot* exist (M. Maggiore). As I stressed previously, **ε** has been "derived" from something we do **not** know (p. 4 in B. Schutz), by sheer wishful thinking and imagination.



The very idea of GWs as “metric waves” that are supposedly “empty” of *any* material content is nonsense. It will be like the grin on the face of Cheshire cat, but *without* the cat: read ‘the three cats in quantum gravity’ at p. 4 in colorless.pdf. There are no “empty” de Broglie waves, propagating in spacetime but not carrying energy or momentum and not associated with *any* particles. But the same type of ‘ghost waves’ are suggested by Kip Thorne and his collaborators. Why? Because GWs are not *physical* waves, like in the example with ordering a pizza above. Instead, GWs are made of mythical “gravitons” (Kip Thorne), which propagate ***within themselves*** only. Why? Because GWs **cannot** propagate in any *physical* medium, like EM waves. Why not? Because the linear GWs *cannot* transport energy: the gravitational “field” does not carry energy-momentum. It just can’t. If it could, gravity will become *physical* field (pizza) and will have to be placed in the right-hand side of Einstein field equations. Read p. 24 in BCCP and p. 13 in zenon.pdf. Period.

Going back to the new topology of spacetime: in many (but not all) cases you may use the murky “local differential geometry” (G. Geroch) and all is sweet, but you are sweeping the garbage under the rug. The ‘garbage’ is the crucial **error** ε (Augustin-Louis Cauchy) in “reaching” *the* limit “at infinity” (if any), which Bishop Berkeley called ‘the Ghosts of departed Quantities’: notice $\mathbf{R_\infty = \emptyset}$ in the drawing here by George Lakoff and Rafael Núñez at p. 9 in hi_numbers.pdf. Bartenders (read above) need not be interested in Mathematics, but mathematicians who *think* like bartenders are not welcomed here. The only way to ‘have our cake and eat it’ is with *finite infinity* (FI): we include **absolutely all** ($\mathbf{R_\infty = \emptyset}$) points in the two-pint beer above with actual/completed infinity and place this *physicalized* object in the irreversible **past** from the Heraclitean flow of time, whereas the never-ending *potential* infinity is booked for the *atemporal* **Platonic** state placed at the potential **future** of *the same* object evolving along the flow of time. We use *two* forms of reality: physical in the irreversible **past**, and **Platonic** in the potential **future**. This is ‘the atom of geometry’ equipped with FI: see Fig. **3** at p. 16 in zenon.pdf and read p. 9 in BCCP. If true, one can expect radical corrections to the current point-set topology, set theory, and number theory. If the current differential geometry and topology can be amended with the new *hyperimaginary* numbers in the atom of geometry, perhaps we can develop quantum geometry and quantum spacetime (p. 27 in BCCP). The task of building the so-called Zenon manifold equipped with **W** (read above) is highly non-trivial. Hint: start with Kähler manifold in which the Hermitian metric vanishes asymptotically at $\boldsymbol{d\,\Omega = |w|^2 = 0}$. Once I get it right, I will retire and have a beer! Meanwhile I will leave my “thirsty colleagues” to struggle with the tantalizing question “what *are* the correct general-relativistic conserved quantities?” (Adam Helfer).

Let me use the opportunity to stress that the true theory of gravity *cannot* be bona fide classical theory. To quote Mihaela Iftime: “Theories like QED, QCD are theories on a fixed (flat or curved) background space-time metric. GR or in any general relativistic theory on the other hand are distinguished from other dynamical field theories by invariance under “active” diffeomorphisms; its field equations are invariant under all differentiable diffeomorphisms (the group $\mathrm{Diff(M)}$) of the underlying manifold M, which have no spatio-temporal significance **until** (emphasis added – D.C.) the dynamical fields are specified.” Thus, the dynamical fields *become* “specified” at each and every instant from the *physical* time $\boldsymbol{\tau}$ (C. Rovelli). The dynamical fields are not like a pizza (read above). Surely the true theory of gravity *cannot* be bona fide quantum theory either. Yet how can ‘John the **Platonic** gravity’ cast its *physicalizable* 4D “jackets” along a continual timelike geodesic? Are these “jackets” *conserved* (p. 9 in BCCP) at each ***individual*** 4D instant from the *physical* time $\boldsymbol{\tau}$? This is the geodesic mystery above, as known since the inception of GR. It has to be resolved along with another geodesic-like mystery known since 1911, thanks to Charles Wilson.

Many years ago, in October 2002, I was struggling with the well-known mathematical fact spelled out by Mihaela Iftime above, and asked, very politely indeed, Britain’s greatest quantum gravity expert for help: “please explain to me what kind of time is implied by ‘moving points around’ in Diff(M)-invariance, and how can your wristwatch read it.” The reply I got from him was more than elusive, to say the least, and I continued to ask GR experts for help. The last feedback hit me ten years later, in May 2012, from Prof. Dr. Maurice de Gosson at the University of Vienna: “Buzz off, idiot!” (Mon, 21 May 2012 18:47:46 +0200).

Any other suggestions?

Watch ‘Spacetime Engineering 101’ (app. 20 min, password protected) on 15 January 2020 at 10:30 GMT. To obtain the password, follow the instructions at pp. 2-3 in Spacetime Engineering.

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