Gravity Waves or Grave Problems?

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The long and ardently sought gravitational waves – long ago predicted to exist by that monument of scientific thought, the General Theory of Relativity (GTR) – have just been found. For a second time, actually, as the first discovery (BICEP2, 2014) – having claimed a "sigma 7" certainty or only a .00000000001% chance of being wrong – was quickly debunked. So this new discovery has been announced jointly by the LIGO Collaboration and the VIRGO collaboration in March, 2016. These waves were detected, it is stated, from the collision of two black holes over a billion years ago. We can hear the voice of Morgan Freeman extolling this on the Discovery Channel in awed, deep and reverent tones.

Despite the hoopla, despite the breathless media announcements, despite the 1000+ authors of the quickly published paper following the announcement, despite the joy of the orbiting community of unquestioning physics faithful and their blogs, perhaps, just perhaps, this is a sad joke. There are two major dimensions of problems. The first is that GTR, on even rudimentary analysis, cannot predict gravity waves. These are a fiction. The second dimension is the detection experiment, its methodology and the apparatus itself. Simply put, there is no way that all the variables can be controlled and accounted for that could provide a different explanation of the detection event as opposed to a registration of these already questionable waves.

Black Holes versus the General Theory

I am going to reprise here, in condensed form, some arguments by physics theorist, Stephen Crothers (www.vixra.org). There will be a couple of equations, just to provide a bit of anchoring into the General Theory, but the essence is their *actual physical meaning*, such as it is. We'll talk of "tensors." and tensors are difficult to explain simply, but it will suffice here to say that a tensor is like a matrix of values that can describe geometrical structure and forces. Take a cube of Jell-O and push against one side with a finger – the resulting distortion of the Jell-O at every point throughout the Jell-O-cube can be described by a tensor. It is a handy mathematical device to describe "fields" – magnetic fields, gravitational fields, etc.

To begin, Einstein's field equations are said to "couple the gravitational field (contained in the curvature of space-time) with its sources." This is to say there is a causal connection between physical sources in Einstein's field and its curvature (i.e., with its space-time geometry). The field equation, mostly already in words, looks like this:

The Einstein tensor = -k [*the energy-momentum tensor*]

In its math form, it looks like: $G_{\mu\nu} = -kT_{\mu\nu}$. The Einstein tensor is the $G_{\mu\nu}$, and the energy-momentum tensor is the $T_{\mu\nu}$., with the "k" being just a constant expressing the "strength" of the coupling (of gravitational field to matter sources). The expression can be written yet more meaningfully, in physical terms, by saying:

Space-time geometry = -k (*material sources*).

Suppose there are no (zero) material forces present. Per Einstein, his field equation then reduces to:

$$Ric = R_{\mu\nu} = 0.$$

The $R_{\mu\nu}$ is the Ricci tensor, or "Ric." But, with more meaning, "Ric=0" now becomes:

Space-time geometry = 0.

Einstein (1916) said that this expression (Ric = 0) describes "the field equations of gravitation in the absence of matter," something that must be true since all material sources in the field = 0. Thus by mathematical construction, Ric equals 0 – because it contains no matter!

Here is the problem: Einstein first mathematically removes all material sources from his field equations by setting material sources = 0 (i.e., energy-momentum tensor = 0), and then he quickly (and surreptitiously) reinstates the presence of a material source by saying that his "space-time geometry = 0" describes his gravitational field "outside" a body such as a star. How, we can ask, can there still be a gravitational field – a space-time geometry – when there are exactly zero material forces with which to couple?

Another field equation playing a role in Black Hole theory and involving Einstein's cosmological constant is:

Ricci Tensor = ƛ (*metric tensor*).

The (cosmological) constant, ƛ, is a value for the energy density of empty space. Physically, this equation is saying:

Space-time geometry = ƛ (*metric tensor*).

Again, there are no material sources in this expression as the energy-momentum tensor (inherent in the Ricci Tensor or Ric) has been set to zero.

The solution to this latter field equation is known as the "De Sitter universe." Per Tolman (*Relativity Thermodynamics and Cosmology*), "the de Sitter line element corresponds to a model which must strictly be taken *as completely empty*," while for Eddington (*The Mathematical Theory of Relativity*), the De Sitter is "the solution for *an entirely empty world*," and Weinberg (*Gravitation and Cosmology*) adds, in the De Sitter, "*there is no matter at all*!"

How, we must wonder, can this theory ever imply a black hole? By definition a black hole is the condensation of a massive amount of matter. But it is from Hilbert's solution (the so-called "Schwarzschild solution") for Ric = 0 that the black hole was first conjectured. Yet Ric = 0 contains no matter for the very same reason de Sitter's empty universe contains no matter – by mathematical construction. The black hole has no legitimate basis in GTR, yet it is from two massive black holes that those celebrity gravitational waves supposedly came to earth.

…And Gravity Waves

The fact that there are no material sources in Einstein's "gravitational field" underlies another difficulty: Einstein's field violates the well-established law of conversation of energy and momentum. Einstein tried to get around this problem by creating what he called a gravitational "pseudo-tensor." It was not really a tensor because, as opposed to the real tensors on which Einstein was insisting, this one depended on a precise selection of coordinates. This preferential selection allowed his gravity waves to travel at the speed of light.

This is a dubious kluge. Eddington would note of it: "*If coordinates are chosen so as to satisfy a certain condition which has no very clear geometrical importance, [then we get that] the speed is that of light; if the coordinates are slightly different, the speed is altogether different*

from that of light. The result stands or falls by the choice of coordinates and, so far as can be judged, the coordinates here used were purposely introduced in order to obtain the simplification which results from representing the propagation as occurring with the speed of light. The argument thus follows a vicious circle."

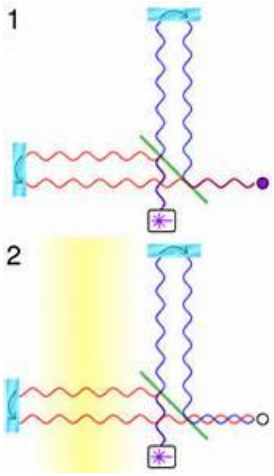
While Einstein claimed that his gravitational pseudo-tensor "*expresses the law of conservation of energy and momentum in the gravitational field,*" the mathematician T. Levi-Civita – one of the inventors of the tensor calculus – showed already in 1917 that the pseudo-tensor is meaningless. Any argument based upon it then is equally meaningless. Intrinsic within the pseudo-tensor is a linear component, and Levi-Civita showed that this component could not exist. As Crothers points out, linear solutions are inherently incompatible with the non-linear math of Einstein's tensors. Since a black hole universe is a solution to a specific set of Einstein's nonlinear field equations it is not possible to extract from it any gravitational waves that are produced from linearized field equations.

Yet grafting or superposing linear models upon Einstein's GTR has been the standard move. A black hole, even could it be legitimately derived from GTR, is at best a solution to a specific set of non-linear field equations which describes *an entire universe,* X, with *just one mass*. Further this universe is spatially infinite, eternal and non-expanding. To have two such holes which collide – as the LIGO event requires – we need, firstly, another universe, Y, and then to linearly combine the two (X +Y). This combination cannot be legitimately done. To make it worse, the LIGO event also presupposes the context of the Big Bang – a theory still clearly held by physics. But a Big Bang universe is the converse: spatially finite, non-eternal, expanding, and containing many masses. Only physicists have had the Zen-enlightenment experience needed to resolve this koan.

LIGO's antennas are L-shaped, with perpendicular arms 2.5 miles long. Inside each arm, cocooned in layers of steel and concrete, is a vacuum chamber two feet wide containing 2.5 million gallons of empty space. At the end of each arm is a mirror hanging by glass threads.

Detection of What?

The LIGO "antennae" are L-shaped, perpendicular, tunnel-like arms, each 2.5 miles long. Each tunnel is a vacuum chamber with a mirror hanging from glass threads at the far end. A laser beam wave is split, the two waves sent out simultaneously to each mirror and returning, meeting at a detector. The crests and troughs of these two waves are perfectly in sync. Normally then, no interference pattern is detected when they arrive back at the detector. But if the tunnels are hit by a gravity wave – a wave which supposedly compresses "space-time" (yes, that incomprehensible "field" without a speck of matter) – the tunnels will distort relative to one another, causing the waves to go out of sync. The crests and troughs are no longer aligned. Now an interference pattern *will* be detected. An early announcement concerning a detection of an event – a tiny "chirp" in one of the mirrors during an engineering run for an upgrade in this huge apparatus – was made in September, 2015, with the official announcement coming five months later.



1. Laser wave split in two by half-mirror, both halves in sync – no interference, no detection.
2. Gravity wave compresses tunnel, waves now out of sync – interference, detection.

I will largely follow a line of critique given by Miles Mathis, another physics theorist rather despised by the physics community (www.milesmathis.com). The "chirp" detected, we must note, was on the order of 10^{-21}, that is, a teeny jiggle in one of the mirrors – a "strain" – smaller than an electron, something way down at the quantum level. How, Mathis asked firstly, can the 2.5 mile-long arms of this machine be damped from all other tiny perturbations in the earth? We have in effect a giant seismometer reacting to every tiny motion on the surface of the Earth, from whatever cause. Since we could not possibly damp it from that, we would have to monitor seismic activity and factor it out. Given the extreme sensitivity involved in the reported gravity wave detection, can this be done at the level of an electron?

Secondly, the heat emitted by the Earth varies over both time and place – another large variation either to damp or factor out. Again, to the level of an electron? The arms being vacuum chambers is relevant to air movement in the tunnels, but irrelevant for damping seismic or heat effects. The arms are directly attached to the earth, and the mirrors attached by threads will react as well. This gigantic antenna, 2.5 miles long, would have to be completely still from

end to end down to the size of an electron with each end of the giant L completely still relative to the other. Any motion of the ends relative to one another will cause the appearance of a detection, since the waves will be thrown out of sequence. To accept such "eternal stillness" stretches credulity. The level of certainty of the physics community over an absolute micro-detection is questionable on its face.

Five months passed from the initial announcement of the detection to the official announcement and scientific paper. It is difficult to avoid suspecting that during this time, some serious back-engineering was going on, a serious wrangling of the black hole numbers to fit the 10^{-21} wiggle. The "black holes" are huge – roughly 29 and 36 solar masses respectively. They supposedly collided a billion lightyears away – far, far beyond our galaxy, itself "only" 100,000 lightyears across. This is nice when you need a phenomenon to gradually fade, to become so small that it fits the finding in the LIGO antennae. Nearer examples of gravity waves would create larger motions, but to get a collision of black holes to chirp with the same strength as an electron being hit by a laser, the black holes must be at an incredible distance. One suspects it simply took a while to back-fit the math to create the needed distance and size of the "holes."

The Reality – Simply a Local Electron Resonance?

It is supremely incongruent to be looking for the effect of gravity waves – you know, from massive things like, say, the sun, the moon, Jupiter – in tiny wobbles or quantum fluctuations. The strain value of 10^{-21} is indicative that we are not dealing with the mirrors actually moving due to distorting tunnels, but rather a motion within the mirrors. Mathis argues that it is basically the laser light interacting with the electrons themselves.

The announcement stated that the mirror is moving .004 the diameter of a proton. Mathis has argued in earlier papers that the electron has a diameter of 1/1821 or .00055 that of the proton. This is the Dalton number, related to the Atomic Mass Unit. Dividing .004 – the magnitude of the detected motion – by .00055 gives 7.28, indicating that what is moving is 7.28 times the size of an electron. In Mathis' model of the electron, this is nearly the exact size (7.22) of his level-2 electron – a "spun-up," next higher energy level electron. This means, again, that the mirror itself is not moving but rather the spun-up level-2 electron inside the mirror. This means the signal in the tunnel is a local resonance between the light, the electron, and the tunnel length itself.

Why is the signal not constant, found only at certain times? It likely is constant, varying only in amplitude. The actual positions of existing electrons in the mirror will change, with the signal hitting a maximum when an electron is perfectly targeted, falling off when the target is less perfect. The engineering run on the newly calibrated machines found it immediately, indicating it has something to do with the lasers and their precise relationship to the material (atoms) in the mirrors. Since the maximum signal is hit and then lost, this indicates the laser may be targeting a valence electron in the material which is accelerated, spun-up (as noted above), and then ejected. Once ejected, it can't be replaced. The laser would have to shift to another location in the mirror for another target. Until it does so, it can only interact imperfectly with other electrons in the area, ones that are only partially targeted. This partial resonance will give us only a partial signal. Such is a far more plausible explanation.

In all, the dubiousness of this "discovery" is epic, so epic, one wonders when we shall see, again just in time for more funding, the third announcement of the first discovery of those mighty – able to move a single electron – "waves of gravity."