

# LIGO, LISA Destined to Detect Nothing

by

Stephen J. Crothers

thenarmis@gmail.com

25th July 2009

It is claimed that the LIGO and LISA projects will detect Einstein's gravitational waves. The existence of these waves is entirely theoretical. Over the past forty years or so no Einstein gravitational waves have been detected. How long must the search go on, at great expense to the public purse, before the astrophysical scientists admit that their search is fruitless and a waste of vast sums of public money? The fact is, from day one, the search for these elusive waves has been destined to detect nothing. Here are some reasons why.

Einstein's gravitational waves do not have a unique speed of propagation. The speed of the alleged waves is coordinate dependent. A different set of coordinates yields a different speed of propagation. Einstein and his followers deliberately choose a set of coordinates that gives the speed of propagation as that of light in vacuum (i.e.  $c = 2.998 \times 10^8$  m/s). There is no *a priori* reason why this particular set of coordinates is better than any other. The sole reason for their choice is to obtain the desired result. Such a method has no validity in science. Here is what the late British scientist Arthur S. Eddington pointed out in his book, 'The mathematical theory of relativity', Cambridge University Press, Cambridge, 2nd edition, 1960:

*"The statement that in the relativity theory gravitational waves are propagated with the speed of light has, I believe, been based entirely upon the foregoing investigation; but it will be seen that it is only true in a very conventional sense. If coordinates are chosen so as to satisfy a certain condition which has no very clear geometrical importance, 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."*

In their calculations for Einstein's gravitational waves, the relativists utilise a mathematical entity called Einstein's pseudo-tensor. In the words of the late British physicist Paul A. M. Dirac ('General Theory of Relativity', Princeton Landmarks in Physics Series, Princeton University Press, Princeton, New Jersey, 1996),

*"It is not possible to obtain an expression for the energy of the gravitational field satisfying both the conditions: (i) when added to other forms of energy the total energy is conserved, and (ii) the energy within a definite (three dimensional) region at a certain time is independent of the coordinate system. Thus, in general, gravitational energy cannot be localized. The best we can do is to use the pseudotensor, which*

*satisfies condition (i) but not condition (ii). It gives us approximate information about gravitational energy, which in some special cases can be accurate.”*

*“Let us consider the energy of these waves. Owing to the pseudo-tensor not being a real tensor, we do not get, in general, a clear result independent of the coordinate system. But there is one special case in which we do get a clear result; namely, when the waves are all moving in the same direction.”*

Now Einstein realised that his field equations do not satisfy the usual conservation of energy and momentum for a closed system and so, in order to save his theory from this catastrophe he simply invented something, *ad hoc*, to make his theory (apparently) satisfy the usual conservation laws; namely, his pseudo-tensor. Not only is this unscientific, it is also unconscionable, and completely fallacious for the following reason. Assumption of the validity of Einstein’s pseudo-tensor implies the existence of a mathematical entity called a first-order intrinsic differential invariant, i.e. an invariant which is dependent solely upon the components of the metric tensor and their first derivatives. One does not even have to know the details of this; all one needs to know is that the pure mathematicians, Georgio Ricci-Curbastro and Tullio Levi-Civita, inventors of the tensor calculus, proved, in the year 1900, that such invariants do not exist! Thus, by *reductio ad absurdum*, Einstein’s pseudo-tensor is a meaningless concoction of mathematical symbols, and consequently everything relying upon it, such as Einstein gravitational waves, is meaningless. Here is T. Levi-Civita’s demonstration of the invalidity of Einstein’s pseudo-tensor:

[www.sjcrothers.plasmareources.com/Levi-Civita.pdf](http://www.sjcrothers.plasmareources.com/Levi-Civita.pdf)

According to Einstein and his followers, his Principle of Equivalence and his laws of Special Relativity must manifest in sufficiently small regions of his gravitational field, and such regions can be located anywhere therein. Now the Principle of Equivalence and the laws of Special Relativity are defined in terms of the *a priori* presence of multiple arbitrarily large finite masses, and so neither the Principle of Equivalence nor the laws of Special Relativity can manifest in a spacetime that by construction contains no matter. Here is what Einstein enunciated in his book, 'The Meaning of Relativity', Science Paperbacks and Methuen & Co. Ltd., p. 56–57, 1967,

*“Let now  $K$  be an inertial system. Masses which are sufficiently far from each other and from other bodies are then, with respect to  $K$ , free from acceleration. We shall also refer these masses to a system of co-ordinates  $K'$ , uniformly accelerated with respect to  $K$ . Relatively to  $K'$  all the masses have equal and parallel accelerations; with respect to  $K'$  they behave just as if a gravitational field were present and  $K'$  were unaccelerated. Overlooking for the present the question as to the ‘cause’ of such a gravitational field, which will occupy us later, there is nothing to prevent our conceiving this gravitational field as real, that is, the conception that  $K'$  is ‘at rest’ and a gravitational field is present we may consider as equivalent to the conception that only  $K$  is an ‘allowable’ system of co-ordinates and no gravitational field is present. The assumption of the complete physical equivalence of the systems of coordinates,  $K$  and  $K'$ , we call the ‘principle of equivalence’; this principle is evidently intimately connected with the law of the equality between the inert and the gravitational mass, and signifies an extension of the principle of relativity to co-ordinate systems which are in non-uniform motion relatively to each other. In fact,*

*through this conception we arrive at the unity of the nature of inertia and gravitation. For, according to our way of looking at it, the same masses may appear to be either under the action of inertia alone (with respect to  $K$ ) or under the combined action of inertia and gravitation (with respect to  $K'$ ).*”

*“Stated more exactly, there are finite regions, where, with respect to a suitably chosen space of reference, material particles move freely without acceleration, and in which the laws of special relativity, which have been developed above, hold with remarkable accuracy.”*

Now the alleged field equations  $R_{\mu\nu} = 0$  describe a spacetime that by construction contains no matter; although Einstein and his followers claim that there is a material source present. It is from these equations that the black hole was conjured.

*“Black holes were first discovered as purely mathematical solutions of Einstein’s field equations. This solution, the Schwarzschild black hole, is a nonlinear solution of the Einstein equations of General Relativity. It contains no matter, and exists forever in an asymptotically flat space-time.”*

DICTIONARY OF GEOPHYSICS, ASTROPHYSICS, and ASTRONOMY, Edited by Richard A. Matzner, CRC Press LLC., Boca Raton, USA, 2001.

<http://www.deu.edu.tr/userweb/emre.timur/dosyalar/Dictionary%20of%20Geophysics,%20Astrophysics%20and%20Astronomy.pdf>

And so  $R_{\mu\nu} = 0$  violates the requirement that the Principle of Equivalence and the laws of Special Relativity must manifest in the gravitational field. Therefore  $R_{\mu\nu} = 0$  is inadmissible. That  $R_{\mu\nu} = 0$  contains no matter is easily reaffirmed by the following. Consider the field equations  $R_{\mu\nu} = \lambda g_{\mu\nu}$ . This solution is called de Sitter’s empty universe, which is completely empty precisely because  $T_{\mu\nu} = 0$ . Now in  $R_{\mu\nu} = 0$  the energy-momentum tensor for material sources is  $T_{\mu\nu} = 0$ . Hence, according to Einstein and his followers, material sources are both absent and present by the very same mathematical constraint. This is impossible. Since  $R_{\mu\nu} = \lambda g_{\mu\nu}$  contains no matter because  $T_{\mu\nu} = 0$ , then  $R_{\mu\nu} = 0$  contains no material sources for the very same reason. It immediately follows as a consequence of this that the total energy of Einstein’s gravitational field is always zero, and so it is impossible for his gravitational energy to be localised, i.e. Einstein gravitational waves do not exist. Moreover, it follows that Einstein’s field equations violate the usual conservation of energy and momentum for a closed system, putting them into direct conflict with the experimental evidence on an even deeper level. Einstein’s *ad hoc* pseudo-tensor can’t be used to save it from this result, since the pseudo-tensor is meaningless. Other pseudo-tensors have been proposed, such as the Landau-Lifshitz pseudo-tensor, which however suffers from exactly the same fatal flaws as Einstein’s. In any event, no pseudo-tensor is a tensor and therefore no tensor divergence can be defined by them.

It is invariably claimed by the astrophysical scientists that the binary pulsar PSR 1913+16 provides physical evidence of Einstein’s gravitational waves. This alleged evidence is indirect in that an apparent decrease in the orbital period is determined by observational methods and this decrease in period is simply attributed to a loss of energy of the binary system by means of radiation of gravitational waves. No such waves have ever been detected. Now there are a number of fallacious assumptions with this argument. First, there are no known solutions to Einstein’s field equations for two or more masses and there is no existence theorem by which it can even be

claimed that his field equations contain latent representations for such configurations of matter. Thus, the description of a binary system has no valid basis in General Relativity. In fact, General Relativity cannot account for the simple experimental fact that two fixed bodies will approach one another upon release. Second, one cannot pile up masses in any given spacetime because Einstein's field equations are non-linear, which simply means that each and every configuration of matter must first be described by a concomitant energy-momentum tensor and the field equations solved for it. One can conceptually pile up any number of masses in the space of Newton's theory of gravitation, although the mathematical complexities of multiple masses quickly become intractable; but there is no conceptual barrier to many masses being present. One cannot however, by means of an analogy with Newton's theory, talk of multiple body interactions in General Relativity. Now Einstein gravitational waves are relevant only to General Relativity. So upon what set of Einstein field equations and upon what solution thereto do the astrophysical scientists rely for a description of a binary system such as PSR 1913+16? The answer is simple: none! They simply apply an inadmissible analogy with Newton's theory. Third, the astrophysical scientists arbitrarily attribute an alleged loss of energy in the binary system to the emission of gravitational waves, propagating at the speed of light. However, as we have seen, there is no unique speed of propagation for these elusive waves, the speed of propagation being coordinate dependent. The astrophysical scientists just pick a set of coordinates to make the numbers come out the way they prefer it. Furthermore, since the total energy of Einstein's gravitational field and sources is always zero, there can be no localisation of gravitational energy at all i.e. no Einstein gravitational waves are possible. Fourth, the mathematical analysis of the phantasmagorical gravitational waves of PSR 1913+16 makes use of the linearised form of Einstein's field equations and Einstein's pseudo-tensor to localise gravitational energy. But we have seen that Einstein's pseudo-tensor is entirely meaningless owing to its implication of the existence of a linear invariant which does not exist! All claims for Einstein gravitational waves are wishful thinking.

It is also worth noting that all alleged black hole solutions pertain to a Universe that allegedly contains only one mass. Since there are no known solutions to Einstein's field equations for two or more masses and no existence theorem by which it can even be claimed that his field equations contain latent solutions for such configurations of matter, these alleged black holes mutually persist in and mutually interact in a mutual spacetime that by construction contains no other masses. In the case of Schwarzschild spacetime, the spacetime contains no matter whatsoever, and so two alleged Schwarzschild black holes mutually persist in and mutually interact in a mutual spacetime that by construction contains no matter. It is quite plain that the notions of black holes existing in multitudes, interacting with one another and other matter such as galactic matter, colliding or merging, and producing gravitational waves, have no basis whatsoever in General Relativity. Moreover, Schwarzschild spacetime is a solution for  $R_{\mu\nu} = 0$ , which, being a spacetime that contains no matter by construction, violates the physical principles of General Relativity and so is fallacious. Nonetheless, in his book 'The Theory of Everything, The Origin and Fate of the Universe'; New Millennium Press, Beverly Hills, CA., 2002, Stephen Hawking says:

*"Also, suppose two black holes collided and merged together to form a single black hole. Then the area of the event horizon of the final black hole would be greater than the sum of the areas of the event horizons of the original black holes."*

Similarly, Bernard F. Schutz asserts in his book, 'A first course in general relativity', Cambridge University Press, UK, 1990:

*"... Hawking's area theorem: in any physical process involving a horizon, the area of the horizon cannot decrease in time. ... This fundamental theorem has the result that, while two black holes can collide and coalesce, a single black hole can never bifurcate spontaneously into two smaller ones.*

*"Black holes produced by supernovae would be much harder to observe unless they were part of a binary system which survived the explosion and in which the other star was not so highly evolved."*

Curiously, the astrophysical scientists claim to have found black holes all over the place; but in actual fact nobody has ever found a black hole anywhere. All claims for discovery of black holes are false. Astronomers at the Max Planck Institute for Extraterrestrial Physics recently admitted this:

[www.sjcrothers.plasmaresources.com/Gillessen.html](http://www.sjcrothers.plasmaresources.com/Gillessen.html)

Thus, the LIGO and LISA projects and their international counterparts are destined to detect nothing. Undaunted, the astrophysical scientists however, never let the truth get in the way of a good story.