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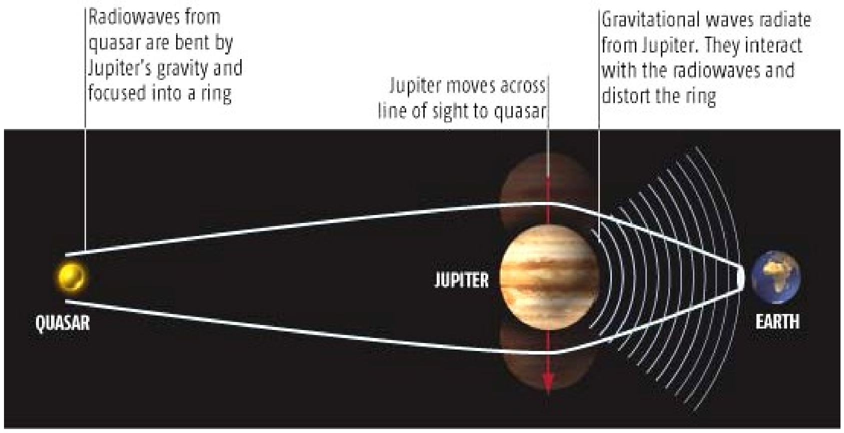
The Speed of Gravity



by Miles Mathis

In 2003, the press worldwide reported that the speed of gravity had been measured, and that it was—within a margin of error—the same as c. [See diagram above.] I just studied that report and immediately saw that it was flawed. The authors of the original research, Fomalont and Kopeikin, simply made a basic mathematical error in analyzing the data, mistaking the speed of their data for the speed of gravity.

But this time, I am not alone in that claim. With more research, I found several mainstream physicists pointing out the same thing. Stuart Samuel, a participating scientist with the Theory Group of Berkeley Lab's Physics Division, in a paper published in *Physical Review Letters*, pointed out the error in the original paper. He said, "In effect, the experiment was measuring effects associated with the propagation of light, not the speed of gravity." Now, nine years later, that opinion seems to be the majority opinion of rank and file astronomers and physicists. Despite that, we still see the original reports leading all searches on this question, so a lot of readers will assume that the speed of gravity has been measured. It hasn't. We also see the mainstream huddling behind the manufactured consensus that gravity travels at c, despite the fall of this central paper. Why? Because particle physicists need gravity to travel at c, so as not to upset their models (see below). Their models are more important than data or logic.

If we continue our research we find that they are still trying to measure or even find gravity waves, but as of 2012, they hadn't done that either. They publish a lot of mainstream articles on gravity waves, to keep the propaganda fresh, but they have exactly what they had almost a century ago: zip.

So what do we really have, concerning the speed of gravity? Beyond the usual disinformation, not much. Tom van Flandern, an independent researcher like me who created a website in 1991 called metaresearch.org, has compiled a page covering most of the history and a great deal of the math and theory. Although I do not agree with van Flandern's conclusion, I highly recommend this page for an understanding of the current problem. Van Flandern had a PhD in astronomy and had consulted for JPL, among others. He worked on the SETI project. And his paper on the speed of gravity was published in *Physics Letters A*, getting a lot of attention for a while before it was buried by Steve Carlip and the other phonies now running theoretical physics. So he is worth looking at again.

It is also appropriate to revisit van Flandern now, because the 2003 experiment was developed to answer his 1998 paper at *PLA*. We can see that straight from the timeline. Fomalont and Kopeikin began working on their experiment soon after the furor caused by van Flandern. The data wasn't recorded until 2002, but they began developing the experiment long before that, running equations and looking for ways to prove them. We may assume that the same top dogs who backed up Carlip also suggested new experiments to help bury van Flandern.

Before we look at Carlip's paper, let us look at van Flandern's. Let us take a few moments to scan his paper at metaresearch.org for sweetspots. I especially recommend his gloss of Greenberger and Overhauser's 1980 experiment, which stands as confirmation of the strong equivalence principle, but not the weak. I will incorporate that fact in just a moment. Collela, Overhauser and Werner in 1975 used an interferometer to measure neutrons, showing little or no mass dependence on the angle of scattering. Other similar experiments in the following years confirmed that.*

I also recommend his subsection entitled "Does a Gravitational Field Continuously Regenerate?" There, he states—though somewhat subtly—that

> It seems impossible to conceive of a static field with literally no moving parts as capable of transferring momentum. This is the dilemma of the "rubber sheet" analogy again. Just because a rubber sheet or space-time is curved, why should a stationary target body on the slope of such a curve begin moving toward the source? What is the source of the momentum change?

Though he has worded this problem in a different way than I have, he is pointing out what I have called the inability of the GR field to explain motion from rest. Having no centripetal forces or accelerations, the curved field cannot explain the *impetus* to motion. The curved field relies on field differentials to explain curved orbits or attractions, but these differentials cannot explain the impetus to motion from rest. Since there is no source for what van Flandern calls "momentum changes," the field relies on a *pre-existing* motion in the field. That is, if the object is *already* moving from one point to another in the field, the equations can explain *the change* in motion. But if the object is at rest in the curved field to start with, the equations cannot explain why the object would begin falling. It *does* begin falling, so the inability of the field equations to explain it is fundamental. This is, I think, what van Flandern is getting at, among other things.

[I would also like to point out that van Flandern believes in Relativity. Some of my readers are anti-Relativists who want to interpret my critiques of Einstein as reasons to throw out Relativity *in toto*. Van Flandern, like me, wishes to re-interpret parts of Relativity, but it is clear he accepts the main lines of it.]

Now, van Flandern's conclusion is that the speed of gravity cannot be infinite, because that would be acausal. So, incorporating all the experimental evidence he sites, he calculates a speed greater than 20 billion times c. Although his evidence and calculations are correct, his conclusion is not. An infinite speed for gravity is acausal only in the case that gravity is a transmitted force. IF gravity is a transmitted force, then an infinite speed is acausal and counterintuitive and all that. But if gravity is not a force field, and is not transmitted between objects, then there is no problem with an infinite speed.

In this case, the speed is not really infinite, because there is *no speed*. No particle is moving *between* objects, so there is no speed. To understand this, let us return to the equivalence principle. This is why it is important that the physicists in the late 1970's proved the strong form of the principle, but not the weak (see above). The strong form says that gravity and acceleration are the same thing. Just reverse the vector. And the strong form says that mass has nothing to do with it. Particle physicists coming from QED, following their own weak form of the equivalence principle, expected mass to be important, because that is what their own equations predicted and required. But the experiments said no. The current princes of quantum mechanics and GR like to ignore that. They ignore all data they don't like. But Einstein's original reversal of the vector is how it is: gravity and acceleration are completely indistinguishable, both mathematically and empirically. *Because of that alone*, gravity must travel at infinity, not at c. Accelerations don't travel at c, so why would gravity, which is an acceleration?

Before we move on, remember that in Newton's field, the acceleration also does not depend on mass. According to the equation $a=v^2/r$, the acceleration depends only on the radius and the velocity. In other words, if you took the Earth out to the distance of Jupiter, and matched their speeds, the Sun would accelerate them both the same. There is no mass in that equation! I will be told that mass matters to Newton, and I will be given the equation $F=GMm/r^2$. But that is force, not acceleration. Gravity isn't a force in the field, it is an acceleration. That is why we don't have an equivalence principle between force and gravity.

So instead of discussing the speed of gravity or of a force, let us discuss the speed of acceleration. What is the speed of the transmission of an acceleration? You will say, “What? The question makes no sense!” Right, that is my point. Asking what is the speed of gravity makes no sense, either. Because, like acceleration, gravity is not a force, it is a motion.

You will say, “But didn't you just say that nothing was moving, therefore no speed?” Yes, but I was talking about the particles that are supposed to be moving between the objects. There are no particles *between* the objects, like gravitons. There is no mediating particle. Gravity is simply a motion of the *main objects*. Like this: rather than say the Earth is attracting the Moon, simply say the Earth is accelerating at the Moon. In that case you have no field and no force. No field particle is moving in the field at any speed, neither at c nor at infinity. Nothing is moving in the field but the Earth and the Moon.

But how do the Moon and Earth communicate? How does the Earth know to move toward the Moon or the Moon know to move toward the Earth, and so on? They don't. Gravity isn't an influence. The bodies are not communicating or influencing one another from a distance. Yes, they may be “communicating” via photons, to mediate the charge field and the E/M field, but that is not what we are talking about here. The gravity field is completely separate from the E/M field, in that regard. The gravity “field” is not communicated. It is not a field. It is a relationship. Not a relationship of curvature, but a relationship of real acceleration. The Earth and Moon each have a constant rate of acceleration, and always have, based only on their size. This acceleration doesn't have to be communicated to any outside object. If I am accelerating at you, do I have to communicate that to you? No. You will know it without any communication from me. There is no line of influence between us. There is no speed of mediation. No particles are being traded between us. Given an acceleration, you don't ask these questions. And that is my point. Given gravity, you should not ask them either. The equivalence principle tells us that gravity *is* an acceleration, and you don't ask how accelerations are communicated, or how fast.

The only good question to ask, given what I just said, is something like, "OK, then why doesn't the Earth just catch the Moon? If the Earth is accelerating at the Moon at $9.8m/s^2$, it should catch it in short order. Why doesn't it?" Because the Earth and Moon and everything else is in a unified field, and the unified field balances both gravity and charge. Yes, the Moon and Earth are accelerating at one another all the time, but they are also charged. The charge is counteracting the gravity, and this (with the tangential velocity) creates a balance. The field of celestial mechanics is not gravity only. It is gravity and charge, each arrayed against the other.

"OK," you will say, "But the Earth cannot accelerate in one direction only. Are you saying it is accelerating in *all* directions? Shouldn't it be getting bigger?" No, the vector is an outcome of circular motion, and so it is an implied force, not a real expansion. Think of the centripetal acceleration in current gravity equations. It points in but does not imply a real compression. [To read more, see my recent paper on the cause of gravity.]

"OK," you will say, "But where does the energy for this 'implied force' come from? How does that conserve energy?" First of all, it conserves it *exactly* as well as the current model, whereby all objects attract one another. I can turn the tables on you and ask, "where does the energy for all this sucking come from?" Gravity is an acceleration in the current model just as in mine, and accelerations consume energy no matter the direction. This is true of GR as well, because it must require energy to maintain curved fields. Current physicists try to weasel out of this by saying that curves are just the normal or default position, requiring no energy. But that doesn't explain motions that aren't curves, like the straight fall of water toward the Earth. That is a straight-line motion of one body toward the center of the other. No curve. How does that conserve energy? It doesn't conserve energy, or there would be no such thing as gravitational potential energy. Gravity is free energy just like my expansion, and of the exact same size. Gravity, *as it is defined now*, is a huge input of energy into the universe at every moment. Second, the conservation laws are laws that fit the existing data. That existing data does not include gravity, so why should I have to include it? The conservation of energy ignores the huge input of gravity I just reminded you of. It says that IF we define the current total energy as zero, it will remain zero. But that could also be stated that IF we define the current total energy input as X (a very high number) it will remain X. Therefore, my model keeps the conservation of energy just like the current model. Nothing is different in that regard.

Now, let us tie up some loose strings. Van Flandern implies in his subsection on space-time curvature that a "refracting medium" explanation of GR can explain a speed of gravity of 20 billion c. This is the interpretation of GR that van Flandern prefers. But it *can't* incorporate such high speeds, much less explain them. It can more easily *propose* speeds above c, I suppose, since it isn't limited at c; but it doesn't *explain* speeds of 20 billion c.

To understand this, we first have to understand that van Flandern is only calculating a lower limit on the speed of gravity when he calculates 20 billion c. What he really finds is a value between 20 billion c and infinity. His lower end is 20 billion c and his upper end is infinity. That is, his calculations don't rule out infinity. He only rules it out later based on its "acausality."

But his refracting medium can't even contain that lower limit. Basically, according to what I understand of it, van Flandern was proposing an underlying field much like my charge field, through which or by which E/M radiation propagates. So far so good. But if photons move at c through this field, and if gravity is transmitted by either particles *or* waves, then the particles or waves of gravity would have to be around 20 billion times smaller than photons, in order to dodge them so well.

Otherwise the "refracting medium" would refract them too much. The photon field would have too much drag on the graviton field.

There are basically two ways for him to answer this, seems to me. Either he says that photons have no density or resistance, so that they provide no drag on the gravitons. I hope he wouldn't have said that, because he was so logical otherwise. I would hate to see him dodging into the virtual particle realm. If you start stating that photons have no drag, you are basically saying they are virtual. If photons are virtual, then gravitons can be, too, and you have solved the problem by simply going non-physical. You have solved it by magic. If van Flandern wants to start accepting virtual particles, he can solve all his problems by fiat, like the mainstream now does.

Or he might answer that gravity influences are waves only, and waves can travel at any speed. At the end of his paper, van Flandern writes of his preference for Lorentz Relativity over Einstein Relativity. Lorentz Relativity does not use c as a limiting factor in the same way that SR does. Van Flandern implies that this allows for a speed of transmission of 20 billion c. But it doesn't. I have shown that SR (and LR) has been misinterpreted in some ways, and that *compound* speeds over c should be allowed and often are (as when calculating blueshifts or when explaining the Pound-Rebka experiment). But we have no evidence that information can travel faster than c. Neither Lorentz nor Einstein ever implied it could. Lorentz came up with his contraction to answer Michelson-Morley, so it is difficult to maintain that Lorentz didn't see the speed of light as a limitation. He did.

We see this problem when we look at van Flandern's paper on the Lorentz contraction, where he says,

In Lorentzian relativity, elysium (the light-carrying medium) is entrained and time is universal, so the need for a Lorentz contraction vanishes.

Although I agree with van Flandern that there must be a universal time (or local time) beneath the idea of relative time, and that Relativity is a sort of "illusion," his use of Lorentz here is a bit confused. Lorentz proposed the contraction, so he would be the last to agree that there was no need for it. This is not Lorentzian relativity van Flandern was selling, it was Flandernian relativity. Yes, the Lorentz contraction only transforms the data, not the reality, so van Flandern is correct in that regard; but since our numbers depend on data, getting correct numbers relies on the proper transforms. The transforms are therefore "needed."

But even if we accept that LR or SR only strictly apply to information carried by light, does that mean that some real field (not light) can travel 20 billion c? Again, I don't think so. I have recently shown that neutrinos are field waves only (not particles), and that they are patterns in the charge field. This is sort of what van Flandern is proposing for his gravitons, according to the wording of this paper. But neutrinos are also limited by c. Their energy is not diminished like photons, but their speed is limited by the field they are in. Therefore, making them field waves only (and not also particles) does not help us. According to any interpretation of Maxwell's equations or quantum equations—either the particle or wave interpretation—both waves and particles should be affected by the field. Neither waves nor particles should be capable of infinite speeds. In fact, neither waves nor particles should be capable of speeds of 20 billion c, since there is no way to get the vacuum pressure or resistance or impedance (or whatever you want to call it) low enough to allow it. Currently, the vacuum or field has enough impedance to keep even a photon, which is said to have no mass and no radius, at c. To get something to go 20 billion c, you would have to make it 20 billion times smaller and less massive than zero. There seems to be a problem there.

Van Flandern might answer me that we should look at energies, not masses or radii or wavelengths. But this would make his graviton 20 billion times less energetic than a low-energy photon, in order to pass through the known field at that speed. Since gravity works at large scales, we have another problem. How can a particle with such a low energy move stars and galaxies?

A further problem arises when we compare charge to gravity. According to the logic above, the gravitational field should be 20 billion times less powerful than the charge field. If its mediating particle is 20 billion times smaller, its field strength should be 20 billion times smaller as well. Perhaps van Flandern might answer, "No, we just need more of these gravitons than we have charge photons." But that doesn't fly, because if we have more of them then the density goes back up, more of them collide with the photons (or the vacuum field), and we have impedance again. We have a Catch-22, since we made them small in order to get them through the field without collision. But if we propose more of them to make them more powerful, they gain in total energy again. So we need the energy low to explain the speed, but we need the energy high to explain the force. Van Flandern can't have it both ways.

To say it again, van Flandern proposed the gravity field as an "electromagnetic wave motion through an underlying refracting medium that is made denser in proportion to the nearness of a source of gravity." How could this medium have so little resistance that it allowed for speeds of 20 billion c? He would have to propose particles very much smaller than photons. I have calculated a radius of the photon of about 10^{-24}m, so van Flandern's gravition, if real, would have to have a radius on the order of 10^{-35}m. This would give it a mass approaching 10^{-50}kg. Or, if we go on energy instead of mass, the energy of each graviton would have to be on the order of 10^{-12}ev. That is vanishingly small, and can hardly account for the strength of gravity at the macrolevel. There is nothing outlawing things that small, I agree, but I find it all unnecessary. All the evidence van Flandern cites in his paper strongly implies a speed for gravity of infinity, not of 20 billion c. All his theorizing is just an effort to avoid that conculsion. None of the data or experiments he cites leads us to the lower limit of his calculations. All the data leads to the upper limit of infinity, and he does the calculations he does only because he doesn't *like* the upper limit.

At this point, van Flandern's only remaining dodge would be that his graviton doesn't *cause* the motions in the gravity field, it simply relays information. This would make it like the current messenger photon, which just sends a message. It doesn't cause motion by any mechanical means. This is a necessary dodge for two reasons: it explains how such a tiny field particle can move such large objects (it doesn't); and, since a graviton could never explain attraction by mechanical means anyway, it dodges the question of attraction via trading particles. That is, even if we have a particle like a graviton, it doesn't explain anything. Attractions can't be explained by bombardment, you know. But of course if van Flandern used that dodge, he is no better than the magicians of QED, who hide among virtual particles and big cloaking math.

Van Flandern *didn't* use that dodge, as far as I know. No, he is known—some might say notorious—for resuscitating LeSage's push gravity. That is, van Flandern was brave enough to look seriously at some very revolutionary (and thoroughly discredited) ideas. Since LeSage basically reversed the vector of gravity, van Flandern was apparently not bothered by the vector reversal. But if van Flandern had simply reversed the vector in a more direct way, as I have, he could have solved both problems at once. If he had accepted my vector reversal rather than LeSage's, he could have easily accepted the infinite speed of gravity. Perhaps he was bothered by the idea of expansion, I don't know.

His mention of the strong equivalence principle in his paper might have led him where I went. My interpretation of gravity might be called “superstrong equivalence,” since I just accept that gravity really IS an acceleration and nothing more. The “strong” interpretation is that of Einstein, who interpreted equivalence to mean that gravity “acted like” acceleration in the field and in the math. But is that really a strong interpretation? Is that what the data really tells us? No. That is actually a fairly weak way of interpretating the data. The data (then and now) tells us there is *no difference* between gravity and acceleration. The name “equivalence” tells us the same thing. If A is equivalent to B, that doesn't mean that A “acts like” B. It means that A is the same thing as B. My reading of the data is the truly scientific one, since I am the only one not trying to push the data. The data tells us that gravity and acceleration *are the same thing*, and that gravity is transmitted instantaneously. Not at 2 billion times c, but instantaneously. I accept that data and fit it into a consistent *mechanical* model. No one else has done that.

Van Flandern was bold enough to see and say outloud that Relativity was a sort of illusion. But he was not bold enough to see the same thing about gravity. Gravity only *appears* to travel at infinity because we assume it is a force. Since it isn't a force, it doesn't have to travel at all. Accelerations don't travel, they simply are.

Although I have shown that even van Flandern shied away from the data, he was much more honest than the mainstream. Steve Carlip led the recent argument against van Flandern, trying to convince the world that gravity moved at c, but to do that required a blatant disregard of all data and all logic. We have reams of data that show speeds of either infinity or above our ability to measure, and no data that show a speed of c. So how did Carlip win that argument? By fiat, basically. The current big boys sided with him and that was all it took. The rest of the field caved. No one published any good arguments on that side. In fact, the published arguments for gravity moving at c were pathetic and should have been an embarrassment to their authors. But it didn't make any difference. Particle physicists want gravity at c, to match their models, so it is. If they wanted the Sun to set in the East to match their models, I guess we would have to say we believe that, too.

Now let us look at Steve Carlip's paper. His second sentence is this:

The "speed of gravity" must be deduced from astronomical observations, and the answer depends on what model of gravity one uses to describe those observations.

This is an unpropitious start. Why? Because it tells us Carlip is misdirecting from the get-go. He is telling us that physicists should and do fit observations to models, rather than models to observations. They do, but they shouldn't. As Karl Popper showed us years ago, science consists of fitting models to observations, not the reverse. Yes, there is some amount of hermeneutics involved, by which previous models may suggest future research; but the current method of jamming all new data into old models by main force and computers is not scientific.

Carlip's very language is different from van Flandern's from the first word. Where van Flandern is transparent, Carlip is opaque. Where van Flandern is direct, Carlip is indirect and sneaky. But if we are smart, and read closely, we should be able to unwind what he is up to. For a start, notice his use of the word “deduced.” That is not only sloppy but false. If your answer depends on your model, it is clear you are *inducing* your answer, not deducing it. Something that is deduced is a necessary outcome. It couldn't be otherwise because it is logically contained in the data. That is what deduced means. So if various models are giving us vastly different answers, only one can be deduced. The others are induced. More rigorously, they are all induced, but only one is correct.

Carlip's third paragraph starts with this:

In general relativity, on the other hand, gravity propagates at the speed of light.

He has just assumed what he is expected to prove here. That is called begging the question. This is typical of the standard model people, who tend to argue in very heavy-handed ways, using all the old tricks. They don't feel they have to convince you of anything, because you are supposed to already be bowing to them. They are certain you are so stupid they can lead with obvious fallacies and fool you anyway. They don't think you will know what begging the question is, or what a red herring is, or what a strawman is, or what a gambler's fallacy is. Most of all, they think you won't be able to spot misdirection, as they slide off the subject and begin discussing things they think you don't understand, like higher math or esoterica.

After that, Carlip begins, yes, *misdirecting*. Rather than address the question at hand, he tells his reader that the force in GR is not exactly central. What does that have to do with it? He talks about the propagation delay being cancelled, then diverts us into E/M by paragraph 4. But that isn't enough. He then diverts into the second and then the third derivative (of the mass quadrupole moment!), assuming that any mention of a third derivative will scare most readers into silence and acquiescence.

Finally, in paragraph 8, he mentions some data, the decay of the orbits of the binary pulsar PSR 1913+16. But once again he just *tells us* that this is "attributed to the loss of energy due to escaping gravitational radiation." Since he gives us no data to back that up, he is beggin the question again. We would need to *detect* escaping gravitational radiation to confirm that, and we haven't detected it. Instead, we *have* detected photonic and other E/M radiation, which should have decided the question. But Carlip continues to assume what he is expected to prove. He simply calls this decay of orbit a "gravitational damping," and then says,

The rate of this damping can be computed, and one finds that it depends sensitively on the speed of gravity. The fact that gravitational damping is measured at all is a strong indication that the propagation speed of gravity is not infinite.

But wait, it *hasn't* been measured at all! It has been "computed." A computation is not a measurement! Carlip isn't presenting an argument here, he is massaging your brain. He is just calling the real data "gravitational damping," and then claiming that is proof of something. He might as well say, "The fact that we gave it a name proves it exists in the form we named it." So if I decide to name my horse "Unicorn," that proves unicorns exist?

Like the other top physicists in the fields of Relativity and QED and String Theory, Carlip is a master of this sort of language. He doesn't know much real physics, but he knows a lot of debating tricks. He can slide something past you like this as well as any carnival worker or Presidential speech writer.

What we have here is ten paragraphs of nothing. There is no content here. It is nothing but sleight of hand. If we compare it to van Flandern's paper, we see a gigantic mismatch. Van Flandern discusses lots of questions at length, including:

a) The fact that the effect of aberration on orbits is not seen

b) The fact that gravity and light do not act in parallel directions

c) The solar eclipse test

d) The decay of PSR 1913+16

e) The binary black hole paradox

f) Ignoring aberration in the retarded potential

But Carlip only addresses two of these in passing. As we have seen, he addresses PSR 1913+16, but does not address any of van Flandern's points. Instead, he deflects us into a short assurance that the decay is due to gravitational damping. And why should we believe that? Because a computer model matched the amount seen to one set of equations in GR. It wasn't even predicted, as he almost admits. Notice his language: the rate *can be* computed. Yes, but anything *can be* computed. IF GR had predicted a rate of decay before it was measured, and IF the measurement were made without using the assumptions of GR, THEN he might have something. As it is, he has nothing.

Carlip also mentions the retarded potential: that is what the third derivative was about. But again, he doesn't address van Flandern's point, which was that aberration (or transverse motion) is ignored, and this ignoring acts as a trick, allowing people like Carlip to fudge from gravity in GR to propagation in a weak-field. What does Carlip do? He continues to ignore it.

How can other physicists take this seriously? How did this ever stand as a rebuttal against van Flandern's well argued points? It was recently updated in 2011, according to the current webpage. Updated how? Was it bolstered in some way? I see no bolsters. Nothing is supported here by so much as a match stick.

Once again, I must caution that this has nothing to do with Relativity. Some will jump to the conclusion that because I have shown that gravity seems to travel at infinity, I am also implying that GR should move at infinity. I'm not. Gravity moves at infinity; but relativistic effects in the GR field move at c. **Time differentials move at c**. I have already accepted that, re-proved that, and used it to prove other new things unknown to current Relativists. See for example my fix to the precession of Mercury's orbit, where I used time differentials moving at c to show a 4% correction to the field equations of GR. I explained the more recent Saturn Anomaly in the same way. In other words, I accepted the basic postulates of GR in order to disprove the currently accepted numbers.

"But how can gravity move at infinity and GR move at c?" Because GR is not a straight expression of gravity. GR is gravity plus time differentials. GR is Newton plus SR. And SR is a calculation of the skewing of data by the finite speed of light. Since SR includes c, GR must also include c. Gravity moves at infinity, but the time differentials in GR move at c.

This is what mainstream physicists have not been able to understand. They have not been able to separate the two ideas. They know that GR is limited by c, and GR is a theory of gravity, so gravity must travel at c, right? Therefore Steve Carlip must be right, even if his arguments are full of holes.

But, no, Steve Carlip is wrong. He is conflating GR with gravity. GR is *not* gravity. GR is a mathematical expression of *data* in the gravity field, including both gravity and time separations. GR allows *us* to make calculations in the field, and to get the right numbers. But objects in the field do not move according to the field equations. They do not make calculations based on data and move accordingly. Objects in the field do not communicate, with eachother or with the field. Everything they do they do *locally*. All actions in the unified field are local. All events are local. So there are no time separations in the real field. Time separations exist between data, not between events.

Let me hammer this home one more time, since I know it will miss a lot of people, even now. Modern physicists think that data *is* the event. Being positivists or empiricists, they will say, “The data is the raw stuff of science. It is the baseline.” But they are wrong. Data is our measurement of an event, not the event itself. That is what Relativity is all about, for heaven's sake. If the event and our measurement of the event were the same thing, we wouldn't need Relativity. We wouldn't need transforms. That is what the transform is: a conversion between the data and the event. Take as your event a supernova explosion. Our data is this: explosion, seen today. The event is this: explosion, many years ago. The speed of light is our transform between the event and the data. It is how we know how long ago the real event was. The data is not the event! GR is a field of data, not a field of events. Events take place locally, but we cannot be everywhere at once to collect this data locally. We collect all the data from the Earth. GR allows us to transform all this data collected on the Earth and to make sense of it. GR transforms all this data skewed by c into a consistent field. That is what GR is. GR is not the gravity field, it is the gravity field as seen from here. Once again, GR is gravity plus time separations. We need the time separations because we are separated from distant objects. They are a long way away. But the objects do not need time separations, because they do everything they do locally. They are not time separated from themselves. Every object “calculates” for itself only, and it is no distance from itself. Or, it “feels” the field only locally. The field is everywhere, so the object is no distance from the field. There is no time separation between any object and the field.

My reader will say, “Well, if that is true, wasn't van Flandern correct? If the field is always local, then we don't really need Lorentz contractions and so on.” *No*, the objects themselves don't need the Lorentz contractions, but we do. We don't need them to figure out how to move ourselves. But we need them to calculate the motions of distant objects. Remember, we don't use Relativity on ourselves. We use it on other objects. Again, Relativity concerns measurements and data. It never concerned local events. GR is applied to data, not to events. GR is a theory of measurement, not of reality. GR is a conversion math, not a theory of existence. It is an operational theory, not a metaphysical theory. Neither mainstream physicists nor average readers comprehend the difference, but they must learn to comprehend the difference.

For this reason, I should be open to giving Steve Carlip and his allies a small bit of slack. Many times they are failing to distinguish between gravity and GR. Just as we saw Fomalont and Kopeikin failing to distinguish between their data and the gravity field itself at the beginning of this paper, we see Carlip failing to distinguish between the field of data in GR and the actual gravity field. For Carlip is right in this: GR *does* travel at c. The *time differentials* in GR do travel at c. But they are all making the same basic mistake: failing to distinguish the measurement from the thing measured. I admit it is a subtle distinction, one that physicists are not taught in school. It is quite easy to mistake GR for gravity itself, and most or all people now do that. Only a few free-thinkers like van Flandern began to see the problem.

I *would* be open to giving the opposition some slack, if they weren't so transparently dishonest, so contemptuous of their audience, and so extravagantly vile. If they hadn't spent so much time viciously squelching dissent, spreading lies and slander, and killing alternative research, I might be convinced to treat them with some respect. As it is, they deserve a much more thorough drubbing than I can ever hope to give them by myself.

*Including the experiment of Borse and Wroblewski in 1983, where they found a 4% “margin of error” between gravity and acceleration. That “error” confirms my correction to GR which I first published in my paper on Mercury's precession. There, I found with simple math—and due to a single simple mistake by Einstein in the field equations—that GR was off by 4% across the board in the field of the Sun.