

## Le retour des deux referee de prl avec mes réponses en rouge!

Dear,

I dont want to insist because i understand its hopeless but following are my answers and comments in red to the referees assuming they might be interested in reading them.

**De :** "prl@aps.org" <prl@aps.org>  
**À :** fhenryco@yahoo.fr  
**Envoyé le :** Mercredi 15 février 2012 5h53  
**Objet :** Your\_manuscript LL13016 Henry-Couannier

Re: LL13016

Do dark gravity theories predict OPERA superluminal neutrinos?  
by F. Henry-Couannier

Dear Dr. Henry-Couannier,

The above manuscript has been reviewed by our referees.

On the basis of the resulting reports, we conclude that the paper is unsuitable for publication in Physical Review Letters. We append comments from the criticism that led to this editorial decision. In accordance with our standard practice (see memo appended further below), this concludes our review of your manuscript.

Yours sincerely,

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Report of Referee C -- LL13016/Henry-Couannier  
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This manuscript proposes an explanation using two metrics for the recent claim by the OPERA experiment of a superluminal neutrino propagation.

The validity of the claim by the OPERA Collaboration (T. Adam et al. arXiv:1109.4897) of a superluminal neutrino propagation is not yet established. Therefore, the flurry of numerous and varied 'theoretical explanations' (as the present manuscript) of such unconfirmed phenomenon is premature.

**There is no a posteriori explanation in this work: the important point is that**

the detection of tachyonic propagations with exactly the same kind of speeds (no free parameter to fit but an unavoidable uncertainty due to our poor knowledge of the local cluster gravitational potential) as those reported by Opera was predicted a long time ago by the theories i refered to and in particular this was already studied in details at page 22 of gr-qc/0610079. The proposed article was intended to be just a short reminder that the prediction wa also made by two other authors who published similar theories.

The first two Referees present strong and solid objections from various sides to the present manuscript. Their argumentation is more than enough to reject the present manuscript.

I already answered the (very few) technical objections in a previous email. As for the general objections such as:

Let me only add that a radical shift of paradigm from Einstein General Relativity to bigravity models must first be able to reproduce the entire massive evidence for Einstein General Relativity cumulated in the past hundreds years.

they only show that the referee didnt even have a look at the refered work where an important effort was made to confront the theory with the entire massive evidence for Einstein GR and in particular show that all PN tests are fulfilled.

As a side remark, the resubmission letter by the author suggests that the author has some misunderstanding of the difference between classical and quantum physics.

I've been teaching QM at university for years. QM starts from a postulate : the Planck-Einstein relations were never derived. I believe this is a serious drawback: basic principles should not look completely arbitrary. For instance general covariance, is not an arbitrary requirement!

In summary, this manuscript is to be rejected.

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Report of Referee D -- LL13016/Henry-Couannier  
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This paper postulates a theory with two conjugate metrics to account for the superluminal neutrino detection in the OPERA experiment. Specifically, the paper claims that the graviational influence of the local cluster could account for the perceived difference in the speed of light for the two conjugate metrics.

As was pointed out by the first referee, this is a very speculative proposal, which in turn tries to explain an experimental result that is in itself highly contested. However, I do not see this as a particular motive to deny publication.

AT last a reasonable reaction.

The points raised by the second referee are more relevant. Indeed, if we want to put forward a different, more speculative theory,

not speculative : the occurence of the conjugate metric only results from giving up one GR hypothesis : the absence of background.

we have to make sure that this theory will survive all our current observations and predictions, or at least, we have to point to directions where it can be put to the test. But let's assume for the moment, as claimed by the author, that these objections are discussed in the referenced papers.

Of course because it's not the place to treat such objections : this was done elsewhere in many many more pages

I would like to add a few objections of my own, that are specifically related to the different speed of lights and the deduced consequences for neutrino observation.

My main problem with the paper is that, for such an extreme proposal, there is a lack of detail in exploring the full consequences of what is proposed.

If a theoretical work is just an extension of the currently admitted paradigm then in general it is possible for it to address a very restricted number of observables, but for a radical shift of paradigm from Einstein General

Relativity it is all the picture that needs to be reinvestigated: for a short publication in prl i had to make choices. For obvious reasons whatever these choices anybody will of course be able to argue as the referee does ... that there is lack of details in exploring the full consequences.

in conclusion it appears that it's not anymore possible to publish any work that would imply a radical shift of paradigm neither in prl nor anywhere else (for the same reasons) because only a book could try to address the "full consequences of what is proposed".

For instance, you will notice that the number of pages of the article has already doubled on the arXiv, just because i decided to explore a little bit more the consequences ... where should i stop !?

At the very least, we would need a list with the details of possible problems and tests. If I understand correctly, the proposal involves a mysterious oscillation of the neutrino beam between this metric and the conjugate metric. These metrics are postulated to exist in parallel, so this oscillation is like an extra input made by hand. For the neutrinos to be detected, the oscillation has to be in both directions. But, if this were the case, one would naturally expect to find a deficit of the neutrinos being detected, compared with the standard prediction. As far as I am aware, there was no such deficit in the OPERA measurements.

A deficit of 50% would currently be interpreted as evidence for sterile neutrinos.

I noticed no publication by Opera on this subject for the time being.

Before my submission there was a MINOS NeutralCurrent analysis published in <http://arxiv.org/abs/1001.0336>

concluding in Jan/2010 that "the fraction that could be converting to a sterile state is less than 52% at 90% confidence level (C.L.)." (this is in the abstract).

I just bet in my submission that the search for sterile neutrinos would confirm what i proposed in my submission.

Now it appears that 50% sterile neutrinos was eventually ruled out in a more recent MINOS publication (mid october 2011) which i couldnt know when i wrote my first manuscript (10 october 2011) and that i actually only noticed recently:

<http://arxiv.org/abs/1110.3455>

Now the issue can be solved in a straightforward way just because, even if the theoretical framework is a well defined and constrained theory of gravity, it of course implies a radical shift of paradigm which consequences on our understanding of the standard model of particle physics (other interactions than gravity) were not explored for an obvious reason: because there are many theoretical possibilities to be explored between which it is difficult to choose the correct one because of the current lack of experimental data related to the effects of field discontinuities. More importantly, at the contrary to what the referee says, the oscillation of neutrinos between the two metrics is not an extra input made by hand. Indeed, the occurrence of field discontinuities where the background (cosmological solutions) exchange their roles was described a long time ago, well before the Opera publication in gr-qc/0610079 and it was demonstrated that such field discontinuities could perfectly explain not only the Pioneer anomaly but even its value (see my now extended new version of the article on the arXiv) . Hence it is from the beginning that this theory has not only two metrics but also a mechanism to allow particles to jump from one metric to the other through discontinuities.

Now of course there are many questions concerning the actual behaviour of the various SM particles when they reach such discontinuities.

Depending on their mass and spin not all of them might be allowed to jump to the conjugate metric and not all of them with the same probability. The issue is a difficult one because it is all our current understanding of the physic of the SM (a multiparametrized model rather than a theory) that has to be reformulated in terms of new rules implied by discontinuities.

For instance the neutrino might be conceived as a particle which wave packet is splitted between the two metrics at the creation (the eigen state of the weak interaction), and the weak interaction (contrary to the EM and strong), one which can only take place at a field discontinuity where any particle can feel the two metrics and hence couple to this neutrino eigenstate. Of course its not necessary to modify the view exposed in the submitted article that each individual plane wave of the wave packet is able to oscillate between the two metrics (again thanks to the discontinuities) so that when the wave packet reaches the detector it will still be equally splitted between the two metrics, each wave having propagated approximately half of the time in each metric (high frequency of oscillation).

I can think of actually many other possible ways but this is a tantalizing one to understand why there is no disappearing effect of the neutrino field wave packet conceived as such weak interaction eigenstate.

The other explanation would

be to have a full in and out oscillation, which sounds even more improbable.

Also, how would this theory affect the present status of photon propagation in matter? The author mentions optic fibres, but it would be relevant to have more details.

Again this should not be explored further in such an article, because there are many open theoretical possibilities on how a photon may behave in presence of discontinuities and not enough experimental constraints.

What would be the implications for atmospheric neutrinos, or solar

neutrinos?

nothing (no disappearing as one that could be interpreted as a sterile neutrino production) if i follow the idea given above :

neutrinos equally splitted between two metric at interaction...

Finally, the paper finds an effect from the gravitational potential of the local cluster of galaxies. Can other possible effects from different gravitational sources be ruled out?

No! the local cluster of galaxies potential is by far the dominant potential as explained in the manuscript.

What about the cosmological evolution, what effect could it have in this type of scenario?

No effect : the speed of light is the same in the two conjugate metrics if one only takes into account the background cosmological field (because it has the conformal form in the coordinate system

where  $\eta = 1, -1, -1, -1$ )

All in all, I do not believe that this paper is sufficiently thorough in the presentation of its theory, and I do not recommend its publication in PRL.

where should i stop to make it acceptable? i believe there is no answer to this question that would satisfy any referee. A final remark: i believe it leads nowhere to ask for two new referees when the first two gave negative decisions: if the referee system was not a feudal one, a referee who has real technical objections (not general ones such as "Opera results should be confirmed first") should at the very least wait for the answer of the submitter before taking decision.

Best regards

F H-C

PS: i dont know if it will be a good idea to resubmit here even after the Opera result has been independently confirmed ...