Review of: "Light Speeds in Stretching and Compressing Spaces"

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Gianfranco Spavieri's Review of "Light speed in Stretching and Compressing Spaces"

What Hajra points out is that we do not have a precise knowledge of light speed behavior when propagating in stretching and compressing spaces. We agree with his position and consider below some arguments supporting Hajra's view.

Most physicists working in advanced theories assume without discussion the validity of light speed invariance. Some of them do not know the advances in this field made in more than a century.

In his Comment on Hajra's article, Corda mentions that the physical speed of light "...represents the ratio between the PROPER distance traveled by the photon and the relative interval of PROPER time. This one DOES NOT change in the stretched space."

Similarly, in his Comment on Hajra's article, Shinkai states,

"The author's discussion breaks the constancy of the speed of light, which breaks the foundation of relativity."

It follows that, according to physicists adhering "dogmatically" to the basic postulates of the theory reflecting the present paradigm, Hajra must be wrong because the present paradigm is right.

Nevertheless, science, as such, is required to be rational and not dogmatic. Assuming dogmatically the validity of a theory does not help the advance of scientific knowledge. History has shown that paradigms, when imposed by the Middle Age Aristotelian Principle of Authority, sooner or later go out of fashion and are systematically replaced by new, more rational conceptions.

Going back to gravitational waves, let us consider more in detail Hajra's argument. The light speed given in formula he presents is the average two-way speed measured in a round trip, in agreement with Einstein synchronization. The phase variations measured with the interferometer are related to differences in the optical path of the arms of the device.

Following Hajra's argument, I would say that, in order for the LIGO and VIRGO experiments to make sense, the assumed validity of Einstein synchronization and light speed invariance need to be tested in stretching and compressing spaces, to begin with.

But why should we doubt about the validity of the fundamental postulate of light speed invariance?

The answer is that we do not know whether light speed invariance is valid or not even in ordinary flat spacetime, let alone in stretching and compressing spaces. It is an ongoing open controversy.

In fact, several specialists on the foundations of special relativity have shown that light speed invariance and Einstein synchronization fail in the interpretation of the optical Sagnac effects (Refs. [1], [2], [3]).

Moreover, in the context of the reciprocal Sagnac effect of Ref. [4], [5], we show that when the contour of an interferometer undergoes an acceleration for a short time interval, the predictions of standard special relativity foresee an anomalous behavior for the interferometry phase shift. Hence, the behavior of light propagation in the contour of an interferometer undergoing a sudden velocity change, may be different from what expected from the Lorentz transformations, which are based on Einstein synchronization and light speed invariance. For this reason, the mentioned effect can be used as a test of Lorentz invariance: the local one-way light speed may be different from c.

Similar results may apply to the interferometer in the presence of gravitational waves. The observed interferometry phase shift may be due to the breaking of Lorentz invariance and the light speed variation described by Hajra, as well as to other effects.

In conclusion, we believe that the arguments of Hajra are physically meaningful.

We do not know what happens to the interferometer when it receives an impulse by the gravitational wave, if it exists. Certainly it is not clear a priori why light speed may remain constant in stretching and compressing spaces.

Thus, we agree with Hajra that, to justify the theoretical foundation of the LIGO-VIRGO experiments, LIGO-VIRGO experts should prove through an independent experiment that the speed of light is invariant even in those steadily stretching and compressing spaces.

The conceptual basis of the experiment as it may be understood from available literature seems to be baseless, if light speed invariance is simply postulated but not verified.

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