Yarman-Arik-Kholmetskii (YARK) gravitation theory versus infantile harassment and abuse

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Abstract

We provide our reply to a new attempt by C. Corda where he calumniates Yarman-Arik-Kholmetskii (YARK) gravitation theory (http://vixra.org/pdf/1705.0287v1.pdf.). It therefore becomes incumbent upon us to once more demonstrate that the origin of his criticism is based on his misunderstanding of the basic aspects of YARK theory, as well as on his misinterpretation of the outcomes of Mössbauer experiments in a rotating system. All of this came to be despite the fact that we had drawn a final point to his agitations in our recent papers published in Annals of Physics in 2015 and 2016 in response to his adverse behavior.

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Recently, Corda located a note on the internet with an ugly and abusive title of "Crackpot behavior of the YARK theory of gravitation" [1]. Below we provide our comment on this unscientific and unethical entry. But first of all, we would like to explain the reason, according to our experience and understanding, for Corda's jealousy with respect to YARK theory. Prior to even this, let us state that, unlike what Corda insinuates, we prefer the acronym YARK not for the sake of self-advertisement, but for the sake of brevity and easy referencing. It is certainly less cumbersome to refer to our work as "YARK" theory rather than "Theory of T. Yarman and his collaborators" as Corda keeps calling it.

The entire story started with our principal disclosure that the energy shift between an emitted and absorbed radiation in a rotating system (emerging in the case when an emitter and a receiver have different radial coordinates) consists of not only the transverse Doppler shift, but an additional component lying beyond the standard relativistic prediction. Originally, this disclosure had been made by our team firstly upon the prediction made by Yarman-Rozanov-Arik in 2007 [2], and secondly based on the re-analysis of the known experiments on this subject carried out in 20th century with respect to the application of the Mössbauer effect [3], and later confirmed in our own Mössbauer measurements conducted in 2008 [4, 5] as well as in 2014 [6, 7]. The experimental results obtained indicate that, instead of the standard expression for the relative energy shift

$$\frac{\Delta E}{E} = -\frac{1}{2}\frac{u^2}{c^2} \qquad (1)$$

(which corresponds to the situation where a source of resonant radiation is located on the rotational axis, while the absorber is fixed on the rotor rim and orbits with the tangential velocity u), we rather have

$$\frac{\Delta E}{E} = -\frac{2}{3}\frac{u^2}{c^2}. \qquad (2)$$

The deviation between the result (2) and the relativistic prediction (1) exceeds by many times the measurement uncertainty of the experiments [4-7]. Under these conditions, it appeared remarkable to present our explanation of the result (2) within the framework of YARK theory; which, as we have shown in ref. [8], actually predicts the presence of the multiplier 2/3 in eq. (2).

However, two years ago Corda published his paper [9], where he tried to show that the result (2) is well explained in GTR, and that there was a missing effect of clock synchronization between a resonant source (located in a rotating system) and a detector of gamma-quanta (resting in a laboratory). This effect induces the energy shift between source and detector, and (according to Corda) it should be added to the second order Doppler shift between source and absorber, which could explains the appearance of the multiplier 2/3 in eq. (2).

In our comment [10] we have shown that such a claim is based on a thorough misunderstanding of the elementary points of the Mössbauer effect methodology, where any detector serves as a counter of resonant gamma-quanta, because even the best detectors used for spectrometry of soft gamma-radiation have an energy resolution about ten orders of magnitude larger than the width of the resonant lines of the source and the absorber. Thence, the detector solely constitutes a device counting just the nuclear source's γ-quanta not absorbed by the absorber in question, and it is totally insensitive to the relative variation of the energy of resonant γ-quanta of the order $(u/c)^2$. Thereby, the "additional component" of the energy shift between the source and the detector derived by Corda is totally out of the scope of the present measurements.

After the publication of our comment [10], we were sure that the issue with respect to any plausible explanation of eq. (2) within GTR was closed; however, to our great surprise, we found in 2016 a new paper by Corda [11], where he insisted on his absurd argumentation in the favor of his neoteric explanation of the Mössbauer rotor experiment, and added some details, which doubtlessly show that the author has problems not only with understanding the Mössbauer effect methodology, but also with elementary concepts of classical causality (for more information, see our paper [12] written as a response to Corda's publication [11]). Moreover; not realizing the ridiculous character of his explanation of eq. (2); Corda, decided to "reinforce" his argumentation and blunderously attacked YARK gravitation theory. He made this in ref. [11] approximately in the same manner as he did in his note under consideration. Therefore, answers to the major part of his criticism in ref. [1] can be already found in our paper [12], and also in more detail in ref. [13], so much so that we would not like to repeat them herein.

At the same time, Corda adds some new argumentation against YARK theory in the present note [1] in comparison to what he did in his paper [11], insofar as distorting a number of statements we made in ref. [12] with respect to YARK theory.

In particular, Corda claims that we assert YARK is a completely non-metric theory. If so (as he claims), it violates the equivalence principle. However, we never stated that YARK belongs to the category of non-metric theories, but rather subsumes features from both metric theories and dynamical theories. As we pointed out in [12], "the link between metric and dynamic relationships is thus established through the venue where the variation of metric versus an infinitesimal displacement is *sensed*, in a manner of speaking, by the particle as the gravitational force".

In other words, in contrast to GTR, *force* is *real* in YARK theory; at the same time, the reason for the emergence of this force is a variation of metric, which substantially distinguishes YARK from any purely dynamical theory.

However, Corda now claims that "the correct gravitation theory must be a metric theory" (p. 4 of ref. [1]). But who said this? And what experimental proof does support this? In particular, with respect to this claim, we would like to stress that, in YARK theory, eq. (1) of [1] does not yield the geodesic equation (8) due to the fact that the first derivative dX^{μ}/dx^{η} already determines the static binding energy, whose variation represents the origin of a *real force* in YARK theory [12]. This already violated the statement by Corda that "these two assumptions (i.e., the existence of space-time manifold and the validity of Einstein's Equivalence Principle (EEP) – insertion of the present authors) imply that the gravitational theory must be purely metric".

Further, Corda classifies the reality of a gravitational force in YARK as "… another very elementary mistake which is connected with the issue that T. Yarman and collaborators claims that YARK theory permits to localize gravitational energy". And then he continues: "Clearly, T. Yarman and collaborators do not understand the real meaning of EEP. In fact, another consequence of EEP is that one can always find in any given locality a reference frame (the local Lorentz reference's frame) in which ALL local gravitational field are null. No local gravitational fields means no local gravitational energy-momentum and, in turn, no stress-energy tensor for the gravitational field".

The above statement, in our view, once more demonstrates Corda's inability to understand the basics of YARK theory: In particular, the "reality" of force as derived in YARK inevitably makes possible the localization of gravitational energy. We have to stress that our statement does contradict GTR (and this obviously disturbs Corda), but we would like to emphasize that the only non-subjective judge which will settle the matter is experiment (but not just Corda).

For example, consider a particle in free fall in the presence of gravity. Then, according to GTR, any gravitational field at the location of the particle disappears, and the local geometry becomes Minkowskian. However, according to YARK, in the state of free fall, the gravitational force continues to exist, but it is exactly counterbalanced by a "fictious force" acting on the particle in the accelerated frame.

In this case, the geometry of space-time in the vicinity of such a particle is characterized in YARK too by the Minkowskian metric tensor. At the same time, in contrast to GTR, the particle continues to "bear" information about the gravitational contribution to this metric and the contribution due to non-inertial motion. This is explained by the principal postulate of YARK theory about the variation of rest mass of any object in the presence of gravity [14-16], which remains altered in the state of free fall, too.

In fact, due to the equality of the inertial and gravitational masses as implied by the weak equivalence principle (WEP), both interpretations of free fall – in either the framework of GTR or YARK theory – are indistinguishable from each other with respect to any local measurements, since the term for the mass of the object at hand is dropped off from YARK's equation of motion.

Thus, YARK theory is characterized by its own intrinsic solid logic (which remains incomprehensible only to Corda), which of course substantially differs from the logic of GTR. At which point, only experiments can tell us which of the two theories comes closer to explaining reality.

In this connection, one first has to emphasize that, in the case of a weak gravitational field, the terms describing the effect of gravity in GTR and in YARK theory coincide with each other at least to the order c^{-3} (see, e.g. [14-16]). In general, this success of YARK theory is not unique, because numerous alternatives to GTR exist (e.g., the scalar-tensor theory by Brans and Dicke [17], bimetric theory of gravitation by Rosen [18], etc.) which also agree with GTR in the limit of a weak gravitational field. Hence, cornerstone astrophysical observations of the 20th century (gravitational redshift,

gravitational lensing, precession of the perihelion of Mercury, Shapiro delay, etc. [19]) – along with the known laboratory scale experiments (see, e.g. [20]) where the mentioned limit of a weak gravitational field is fulfilled – happen to be, in fact, inconclusive, and permit multiple interpretations of their results.

At the same time, there are some obvious advantages in which YARK theory is distinguished from GTR and from some of its alternatives, in particular, the absence of any problems with the implementation of the energy conservation law, and the natural symbiosis of YARK with quantum mechanics [21].

What is more, the recent detection of the GW150914 and GW151226 signals by the LIGO Scientific Collaboration (LSC) interpreted as the first observation of gravitational waves resulting from the merger of two stellar-class black holes [22, 23] leaves YARK theory as the single alternative to GTR which provides its own explanation to these signals [24].

One more principal point in favour of YARK theory is its explanation of modern experimental facts which still remain incomprehensible under the framework of GTR:
- Derivation of the alternating sign for the accelerated expansion of the Universe, which is directly furnished by YARK without the need to invoke "dark energy" [25].
- Analytical presentation of the Hubble constant [25].
- Elimination of the information paradox for black holes of the YARK type [14].
- Explanation of the fact why galaxies get formed mostly as disks, while stars coagulate as ellipsoids [25].
- Wave-particle dualistic justification for the substantial dissimilarity between the gravitational deflection of low-energy and high-energy photons [16], which was recently established in a preliminary experiment at Deutches Elektronen-Synchrotron (DESY) when high energy gamma-quanta resulting from Compton scattering of laser beams on ultra-relativistic electrons were analyzed [26].

Finally, the results of Mössbauer experiments in a rotating system [3-7], strongly support the validity of eq. (2), which is naturally derived in YARK theory while remaining strongly at odds with the classical relativistic prediction (1).

These achievements already make YARK the most successful modern space-time theory in the explanation of the available experimental facts. At the same time, even under these circumstances, we did not ever state that YARK (unlike what Corda writes) "… should replace Einstein's general theory of relativity as the incorrect theory of gravitation…" [1]. Rather, in ref. [12] we emphasize the need for further experimental tests of GTR via the Mössbauer effect in a rotating system, with the improved performance of such experiments.

Finally, Corda dared to request from the Editor of the prestigious journal where several of our YARK papers were published [14-16], to withdraw our publications "for the sake of scientific correctness". However, we already demonstrated above that Corda's attacks against YARK have nothing in common with the notion of "scientific correctness". We only regret that this scientifically erroneous, furthermore impolite and non-ethical paper by C. Corda had been supported by the Research Institute for Astronomy and Astrophysics of Maragha (RIAAM).

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