

## Reply to “Unscientific behavior of the YARK theory of gravitation” by C. Corda

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**Abstract.** We respond to one more attempt by Corda (vixra: 1709.0190v1) in criticizing the Yarman-Arik-Kholmetskii (YARK) gravitation theory, and show the fallacious character of his aggression.

Recently, Corda located his paper [1] against Yarman-Arik-Kholmetskii (which, for brevity, we call, YARK) theory of gravity, where he persistently demonstrates his failure to understand the essence of our approach, claiming instead that we made elementary errors in its development, etc. In fact, the major part of [1] contains the repetition of Corda’s previous attack against YARK theory [2], that we had already answered in our papers [3-5].

Below we present our comment only with respect to some new points of his criticism on the basis of our seven assertions collected by Corda on p. 5 of [1], where though he distorted some of them as usual.

**Point 1** (Claiming that Corda does not understand the Mössbauer effect methodology).

He replies “*Point 1 is false. In [20] (which is herewith ref. [6]) we have shown that it is instead the YARK club which understand neither their proper Mössbauer effect methodology, nor the clock synchronization in relativity theory*”.

In this respect, we first of all have to remind that one of the authors of the present paper (AK) headed one of the most effective scientific groups working in the field of Mössbauer effect methodology at the end of the past century and at the beginning of the present century, which substantially contributed to further development of this topic (see, e.g., refs. [7-15]). We like to add that the accumulated rich experience in the methodology of the Mössbauer effect had been directly used by us in the development and performance of the Mössbauer experiments in a rotating system achieved first in Minsk in 2008 [16, 17] and later in Istanbul in 2014 [18, 19]. Thus, when a pure theorist such as Corda claims that we do not understand the methodology of these experiments, this only gives us smiles.

Concerning his claim that we do not understand the clock synchronization in relativity theory; we, by the way, never argued against the additional component that comes into play with respect to the energy shift between a spinning source and a resting detector due to their clock synchronization as derived by Corda [6]. The problem (which remains outside the scope of Corda’s understanding) is that such a component of energy shift cannot be captured by our measurements, as we have explained several times in the past (see, e.g. [3, 4]).

On the other hand, Corda keeps ignoring the fact that our team has provided a sound quantum mechanical answer to the extra energy shift detected in the Mössbauer rotor experiments [20]. In fact, Corda systematically avoids touching on this point, fearing no doubt to unwillingly invite awareness of the audience with regards to the fact that YARK indeed works in natural symbiosis with quantum mechanics.

**Point 2** (where we emphasize that in YARK theory, the gravitational force is real).

A major part of Corda’s excoriation of this aspect of YARK theory does not contain any novelty in comparison with his previous publication [2], and we already commented against it in refs. [4, 5]. At the same time, he now adds something new: “*Clearly, even admitting that this static binding energy does not violate the LLI (which is already unscientific), the “fictitious*

force” will generate an energy which will contribute to the first derivative  $\frac{dX^\mu}{dx^\nu}$  counterbalancing the effect of the static binding energy”.

Concerning the first phrase of this sentence, we notice that the definition of “static binding energy” is well known, and, like any other reasonable definition, it cannot itself violate (or confirm) LLI (local Lorentz invariance). Thus, the epithet “unscientific” is rather relevant to the phraseology of Corda than to the mentioned definition. Moreover, the second part of Corda’s sentence indicates that he forgot the elementary physics, which states that a fictitious force is derived in the adopted designations only in the coordinate system  $X^\mu$  (e.g., in YARK theory, eq.

(1) of [1] reads as  $\frac{d^2 X^\mu}{dT^2} \sim f_f^\mu + f_g^\mu = 0$ , where  $f_f^\mu, f_g^\mu$  are the fictitious and gravitational

forces, correspondingly), whereas the derivative  $\frac{dX^\mu}{dx^\nu}$  is calculated via the metric relationship between the corresponding coordinates (see, e.g. [20]), and does indeed depend on the static binding energy.

Thus, the abovesaid criticism by Corda is unfounded.

**Point 3** (with respect to the detection of GW150914 and GW151226 signals and their explanation in YARK theory).

Discussing the problem of polarization of gravitation waves (GW) with respect to the discrimination of gravitation theories alternative to GTR, Corda claims that “...*this discussion is very far beyond the knowledge and understanding of YARK club*<sup>1</sup>”. However, in the introductory section of our recent paper [21] we also pointed out the impossibility to arrive at any conclusions about the polarization of the detected LIGO signals, so that these signals do not provide a convincing proof in favor of GTR amongst its alternatives. Thus, when we write in the discussion section of ref. [21] that at the moment YARK theory is the only alternative to GTR which provides its own physical interpretation of the GW150914 event, we implied in this context that this interpretation is made *beyond the hypothesis* about GWs. Thus, Corda’s claim is fallacious once again.

**Points 4, 5** – we already answered them in ref. [5].

**Point 6**, where Corda writes: “*As we claim that the correct gravitation theory must be a metric theory the YARK club asks: “But who said this? And what experimental proof does support this?”*”.

Here we omit the comment by Corda with respect to this point (where he again erroneously claims that YARK theory violates EEP, etc., which we have answered earlier). We only stress that we indeed have the right to ask these questions, because at the moment, YARK theory is not less successful in comparison to GTR (on the contrary, it is even more successful with respect to modern experimental data).

**Point 7** (“*The YARK club claims that GTR has problems with the implementation of the energy conservation law*”).

Rather, we asserted that YARK theory does not have any problem with the implementation of the energy conservation law. Indeed, in YARK theory, we have the energy-momentum tensor, while in GTR we have the energy-momentum pseudo-tensor, which obeys tensorial transformation only under linear space-time transformations.

Finally, we would like to stress that we are always glad to discuss the physical meaning and implications of YARK theory, but not in a style and tone disrespectfully imposed by Corda. First of all, he must answer the question: why the “unscientific” YARK theory is so successful in the explanation of both old and modern experimental results in space-time physics and cosmology? Then, we could continue discussion in a more constructive way.

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<sup>1</sup> Naming our collaboration as a “club”, Corda obviously wants to give offense to the YARK team. But really, this induces only our smiles in the context of the entire discussion.

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