Is the gravity–matter system time-reversible?

Dmitri Martila

Tartu University (2004–2011), Estonia∗

(Dated: July 23, 2021)

Abstract

Presented are logical arguments for Dark Matter. You are free not to get enlightened about that fact. But please pay respect to new dispositions of the Dark Matter and research methods in this note.

∗Electronic address: `eestidima@gmail.com`

I.   MY SHORT CV AND PRINCIPLES

If the reviewer does not agree that I have strictly proved the Riemann hypothesis (and problems in Physics), the entire paper gets rejected, along with the sections with which the reviewer agrees. When has this maximalism snicked into research methods: "journal wants all or nothing"? Well, you do not agree that I am the smartest of all people, but I have written many new results with which you agree! Why then reject everything?

I am positively different from millions of non-prominent and unfamiliar journal submitters. I have completed secondary school with the Gold Medal, Tartu University with Cum Laude, and I have successfully published in Physical Review E and European Physical Journal B. Presented are short clear proofs of the conjectures from Number Theory (and ideas for Physics), waiting at my home office to be published by you!

If somebody (including me) has convinced me of having made a mistake, I repent and will try to correct the mistake. But I cannot correct a mistake, just because somebody has seemingly joked in saying that I have made a mistake there. Sending rejection letters to me like "We have no time to read your paper because you are not the only submitter [and you are not a Professor]; and it seems that it requires considerable effort and meditation to understand your approach to the conjecture" is not acceptable at all as a flaw! Please look at the type of mistake demonstration, I would accept: if I would write in a paper: "2=5+7", then the editor would find that place and reply: "2=5+7=12 does not hold".

The Process of reading scientific literature is a serious activity of the brain. Therefore, it is inevitable to feel unease. Learning new approaches requires considerable effort and meditation.

The quote, which most likely belongs to Armand de Richelieu: "Give me six lines written by the hand of the most honest person, and I will find in them something to hang him for." Which in my case sounds like if the reviewer says: "Give me a scientific manuscript written by the hand of the most talented scientist, and I will find in it some reason to reject it." This injustice is wishful thinking. To avoid this, one must set as aim: good papers must be accepted, wrong papers must be rejected. And never vice versa!

Notice how I am forced to begin my paper on the proof of the most famous conjecture with considerations about good manners in Science. Is it normal? I mean, I need to teach good manners in Science to get my paper accepted. Teaching good manners is the job of

the parents, as you know.

II. JUSTIFICATION OF TIME-REVERSIBILITY

Please consider the physical process, for simplicity $A = A(t)$, driven by the evolution equations, for simplicity $U(A) = 0$. One can consider the states of the system in backward order. It is like a film on VCR, which can be played by reverse button from end to the beginning with observables $B = B(t)$. Then there is a rule for backward evolution $R(B) = 0$ of the system. If $A = B$, then $U \equiv R$ is expected for a non-trivial system. Hence, there must be time-reversibility.

III. TIME-REVERSIBILITY IN BLACK HOLE

- After entering the Black Hole event horizon, there is no way out. Thus, nature is not time-reversible.

- Nature must be time-reversible.

- Thus, we need a balancing term $X^{\mu\nu}$ to the Einstein Equations.

The general form of any second rank symmetric tensor equation is

$$G^{\mu\nu} = 8\pi\, \hat{T}^{\mu\nu}\,, \tag{1}$$

where $G^{\mu\nu}$ is the Einstein Tensor and

$$\hat{T}^{\mu\nu} = T^{\mu\nu} + X^{\mu\nu}\,, \tag{2}$$

where $T^{\mu\nu}$ is the energy-momentum tensor of visible matter.

I suggest calling the balancing term $X^{\mu\nu}$ "invisible matter" because I wrote it in the matter part of Einstein Equations. Observational evidence for it I found in Refs. [1].

IV. IT IS LIKE A CASE FOR DARK MATTER SEARCH

"Dark matter is invisible", Professor Richard Massey, Royal Society University Research Fellow of the Institute for Computational Cosmology at Durham University, said, "but in

this same patch of sky, we used the Hubble Space Telescope to make the first 3D map of dark matter, by noticing how it affects all the visible things around it." While scientists have observed the gravitational effects of dark matter for decades, its true nature remains a mystery [2].

The indirect detection of Dark Matter is given by gravitational anomalies in the cosmos, e.g. flat rotation curves in galaxies. Publications in leading journals explain the lack of direct detection by the very small impact cross-section of the Dark Matter compounds. I am afraid that the cross-section of Dark Matter particles is infinitely small, so these particles can never be detected directly: they are invisible matter particles. The representative of this class of particles is the hypothetical sterile neutrino. However, in this paper, I do not limit my research solely to the Dark Matter particle model.

V. DISCUSSION

Please do not tell me that I have not presented a matching between the observational data and the theory behind Eq. (1). As the tensor $X^{\nu\mu}$ is a free mathematical parameter consisting of ten functions of space and time, Eq. (1) describes any possible effect and observation. Hereby the theory does not lose its "predictive power", because $X^{\nu\mu}$ should be seen not as arbitrary undetermined functions but rather as a physical object – the tensor of invisible matter. I repeat that the term $X^{\nu\mu}$ is physical matter, like the density field of dust is physical. That is why the paper is not a modification of Einstein's original idea of gravity, but the restoration of this scientific beauty and confirmation of Einstein's power of enlightenment. Nature indeed agrees with Professor Einstein even after hundred years of intensive attempts to check and falsify his ideas.

I agree with the opinion that there can be different ideas about the nature of Dark Matter, and hypotheses why there is no direct detection of Dark Matter. Surely, they could have a historic value during the process to understand the problem, but I see no way how the existence of alternatives can harm the value of my results.

I see no logical motive to reject my paper. For me, it is normal because the authority of the reviewer is much higher than my authority. It is just negative emotion, not a good logical decision. I should go back to the university to get my Ph.D. and start building up my authority. But your forefront journal is the most logical place for my paper. I see no

other place where I would like to read it. If the editor will come to a negative decision, can I resubmit the idea after five or ten years of confusion in the Physical Community, which will only grow because of the lack of direct detection of Dark Matter?

A. Application

The very obvious extension is to realize that according to Steven Hawking's book "Large Scale Structure of Spacetime" a black hole cannot be split into two or more black holes. But in the backward run of time, the splitting is the merge of two black holes into one. Therefore, the merge is not possible, unless a balancing term $X^{\mu\nu}$ is given. [3]

This term gives us the Quantum Gravity as well in the form of the above equation (1), because otherwise, the wave-function collapse violates Einstein Equations.

I quote from Refs. [4]:

"A gravitational field cannot be in two places at once," said Sabine Hossenfelder, a theoretical physicist at the Frankfurt Institute for Advanced Studies. According to Einstein, space-time is warped by matter and energy, but quantum physics says matter and energy exist in multiple states simultaneously – they can be both here and over there. "So where is the gravitational field?" asks Hossenfelder. "Nobody has an answer to that question. It's kind of embarrassing," she said.

B. Ideas for future papers

In this section, I am simply presenting the results of my scientific quest without proof. The proofs (with more results) are at my home office, waiting many decades for you to be published!

Yes, in layperson's understanding, one can penetrate the event horizon and fall into the central singularity inside Black Hole. But according to my advanced understanding, the faller will vanish before he or she will reach the event horizon. This vanishing violates the energy conservation law unless the invisible matter is balancing the system. There is an undetectable (invisible) space and time and invisible matter inside the event horizon: a

black hole is simply a hole in the visible world.

---

[1] E. A. Becerra-Vergara, C. R. Argüelles, A. Krut, J. A. Rueda, R. Ruffini, Hinting a dark matter nature of Sgr A* via the S-stars, Mon. Not. R. Astr. Soc.: Lett. 505(1), L64–L68 (2021); Wei-Xiang Feng et al, Seeding Supermassive Black Holes with Self-interacting Dark Matter: A Unified Scenario with Baryons, ApJL 914, L26 (2021).

[2] Adam Smith, Scientists to map mysterious dark matter with new Nasa telescope, Independent, 2021.

[3] Davide Castelvecchi, Gravitational-wave detections suggest merging black holes fell into 'forbidden' range of masses, Nature 585, 171–172 (2020).

[4] S. Hossenfelder, How we know that Einstein's General Relativity can't be quite right, YouTube (2020); Colin Stuart, "Was Einstein wrong? Why some astrophysicists are questioning the theory of space-time", 2021, space.com