One can not observe the impact with detector the zero cross-section Dark Matter particle: it is invisible matter

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(Dated: May 23, 2021)

Abstract

The indirect detection of Dark Matter is the gravitational anomalies in the cosmos, e.g. flat rotation curves in galaxies. The leading journals explain the lack of direct detection by the very small Impact Cross Section of the Dark Matter compounds. I argue that in the case of Particle Dark Matter the cross-section is infinitely small, so can never be directly detected. In such a case I would use the term "Dark Matter of Virtual Particles". The representative of it is the hypothetical sterile neutrino. I am not limiting my research by the Particle Dark Matter model.

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I. MY SHORT CV AND PRINCIPLES

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 results, 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 problem" 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".

In the reading process, the brain does mental activity and dwells on what was read. A new web of connections in brain cells should have the time and rights to emerge. Scientific trust, curiosity, and interest are necessary to be in origin because the instinctual defense mechanism of the brain [called "skepticism"] does not allow new "software" to be "installed" in the deep, operational tissue. This defense is necessary because malware (or defective software) if installed, will harm the consistency of the system. The authors of mental malware are called "intellectual terrorists". However, reading an original scientific paper is a complicated learning process. I have very new material, so you should learn; thus, it is normal to feel unease.

II. THE PAPER

Because dark matter has not yet been observed directly, it must barely interact with ordinary baryonic matter and radiation, except through gravity. Most dark matter is thought to be non-baryonic; it may be composed of some not yet discovered subatomic particles. The primary candidate for dark matter is some new kind of elementary particles that have not yet been discovered, in particular weakly interacting massive particles (WIMPs). Many experiments to directly detect and study dark matter particles are being actively undertaken,

but none have yet succeeded.

Dark Matter is presented as a consequence of the hypothesis of augmented reality. Dark Matter still needs hard science research to identify and to understand it. However, I have done the hardest work as well (during the last 17 years), and so my effort is better to be respected. I base my findings on observations and experiments, in particular on the fact that detectors have detected nothing. This is a negative experimental fact which is presented as a positive one in my paper. I see no logic gaps in my argumentation on this. Dark Matter is a logical construct without unsupported premises.

Elon Musk seems to believe that our world is a simulation: one part of our world is simulated (part A), the other part is not (part B): it is like augmented reality. I argue that part B is a galaxy, but part A is the Dark Matter surrounding that galaxy. Hereby, I am calling Dark Matter being the virtual reality, the virtual matter.

Indeed, the failure of direct detection of Dark Matter tells at least to me that Dark Matter passes through our reality as being free from interaction with it. Gravity is not the direct-contact interaction, as is known. This is just like the augmented reality of the Pokémon Go game; the virtual monster Pokémon is being placed into our reality without direct interaction with it. [6]

It is understandable why underground detectors for particles of Dark Matter have caught absolutely nothing for so many years of work. Usually, particles have a pretty strong effect on our world. But such small corpuscles as neutrinos have the weakest effect on ordinary matter. I give convincing arguments that Dark Matter acts so weakly on our world that its direct-contact action is equal to zero. That is why Dark Matter passes through the devices that are built for its capture completely without noticing them, completely without labor and friction with these devices. Such Dark Matter is a representative of the "invisible" world, i.e. the detectors trying to detect it locally are "blind", they see nothing. It falls into the third category of matter according to the following classification:

1. Living visible matter - people, animals, artificial animals (latter is Artificial Intelligence), plants, microbes, insects, fish.

2. Non-living visible matter - stones, rocks, ice.

3. Non-living invisible matter - Dark Matter, Dark Energy.

4. Living invisible matter - the prediction of my classification of matter.

"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 still remains a mystery. [7]

According to my classification, phosphorus found in nature will be part of inanimate matter, and phosphorus in the human body will be part of living matter. For example, as long as feces are in the body, they are part of a person.

The periodic table of Dmitri Mendeleev has predicted many chemical elements. Recall also the story of the positron [it is like a "positively charged electron"]: the existence of this elementary particle was predicted. I also have a logical classification table. I predicted the discovery of 4-th kind of matter.

III. EQUATIONS OF GEODETIC MOTION

Consider Reissner-Nordström black hole. From the rest state at $r = R$, let us release a small, electrically neutral test body.

The metric is t-independent, so the test-body has a velocity component $u_t = -E = \text{const}$. The falling is radial, so $u^\theta = u^\phi = \text{const} = 0$. Using normalized velocity vector with $u_\nu\, u^\nu = g^{tt}\, u_t\, u_t + g_{rr}\, u^r\, u^r = E^2/(-A) + (u^r)^2/A = -1$, for the radial component of velocity one has

$$(u^r)^2 = E^2 - A\,, \tag{1}$$

where $A = 1 - 2M/r + Q^2/r^2$. Starting at $r = R$ with radial velocity $u^r = 0$, one has

$$E^2 = 1 - 2M/R + Q^2/R^2\,, \tag{2}$$

and

$$(u^r)^2 = Q^2(1/R^2 - 1/r^2) + 2M\,(1/r - 1/R) =$$
$$= (1/r - 1/R)(2M - Q^2\,[1/R + 1/r])\,. \tag{3}$$

For $r < R$ with $(u^r)^2 > 0$, one obtains $r > r_m = 1/(2M/Q^2 - 1/R)$. Thus, the test-body has not reached the singularity at $r = 0$.

IV. VANISHING SIZE

Further research has shown that the proper size of the body shrinks to zero at $r = r_m$.

Consider a drop of "perfect fluid" falling into a Black Hole. Because the drop is small, the velocity of every part of it is the velocity of the fall. The equation of matter is $T^{\mu\nu}_{;\nu} = 0$, thus $u_\mu T^{\mu\nu}_{;\nu} = 0$, where

$$T^{\mu\nu} = (\rho + p)u^\mu u^\nu + p\, g^{\mu\nu}\,, \tag{4}$$

where pressure p and density ρ are the inner characteristics of the drop. Thus,

$$-(\rho + p)_{,\,\nu}\, u^\nu - (\rho + p)\, u^\nu_{;\nu} + (\rho + p)\, u^\nu\, u^\mu_{;\nu} u_\mu + p_{,\,\nu}\, u^\nu = 0\,, \tag{5}$$

where $u^\mu_{;\nu} u_\mu = 0$, because $(u^\mu u_\mu)_{;\,\nu} = (-1)_{;\,\nu} = 0$. As $u^\nu = dx^\nu/ds$, one has

$$-\frac{d(\rho + p)}{ds} - (\rho + p)\, u^\nu_{;\nu} + \frac{dp}{ds} = 0\,. \tag{6}$$

Here and in the following, the index with semicolon means the covariant derivative uses Christoffel symbols, while the index with comma means the ordinary derivative with respect to the spacetime coordinate.

This differential equation has no solution, unless the fluid is compressible. Let the equation of state be $p = p(\rho)$. Then

$$\frac{d\rho}{ds} = -(\rho + p(\rho))\, u^\nu_{;\nu}\,. \tag{7}$$

Now the rate (and sign) of the change of the density depends on $D := u^\nu_{;\nu}$, and the formula coincides with the one given in Ref. [1], pages 226–227.

If one inserts the above velocity u^ν into the divergence, one gets to know that $u^\mu_{;\mu} \sim 1/u^r \to -\infty$ at $r = r_m$. The idea of the paper is proven now because the position of the latter special point r_m coincides with the special point r_m in the previous chapter, derived by the first method.

It is interesting to note that for a Schwarzschild Black Hole ($M \neq 0$, $Q = 0$) one has

$$D := M\, \frac{4\,r - 3\,R}{\sqrt{2\,M\,R\,r^3\,(R - r)}} \tag{8}$$

With the zero at $r = 3R/4$ being the starting point for the compression. Notably, this happens at an infinite distance from the Black Hole, if R is infinite. Such an unexpected result hardly can be found in Newton's age, even while we still have a weak field at $r =$

$(3/4)R \gg 2M$. The deadly ripping with $D \gg 1$ never begins, but the deadly compression with $D \ll -1$ happens at the singularity $r = 0$. This has been shown by several methods, including the study of the geodetics deviation equation. The effects of this paper are found in Kerr and Kerr–Newman spacetimes. The vanishing of particles with light-like geodesic is found as well. [8]

The drop's density at $r \to r_m$ diverges because of

$$\frac{d\rho}{\rho} = \left(-D - D\frac{p(\rho)}{\rho}\right) ds\,. \tag{9}$$

Integration of both sides produces

$$\ln(C\,\rho) = \int \left(-D - D\frac{p(\rho)}{\rho}\right) ds =$$

$$= \int \left(\frac{D}{u^r} + \frac{D}{u^r}\,\frac{p(\rho)}{\rho}\right) dr = \infty\,, \tag{10}$$

where C is a constant of integration.

V. SOLUTION TO THE CONTRACTION

Because the contraction seems to go beyond the energy-momentum conservation law [2] and General Relativity, I have endured the known law $T^{\nu\mu}_{\ ;\nu} = 0$ with the tensor of invisible Virtual Matter $X^{\nu\mu}$,

$$(T^{\nu\mu} + X^{\nu\mu})_{;\nu} = 0\,. \tag{11}$$

I call the Virtual Matter "invisible" because it should go through underground "detectors of Dark Matter" without the slightest effort. Why? Because being just a mathematical fix to the contraction of the test body, Virtual Matter is not a new kind of matter; hence, it does not interact with the visible matter even via the weak interaction. To my understanding, Virtual Matter with $X^{\nu\mu}_{\ ;\nu} = 0$ is called Dark Matter, and Dark Matter with $X^{\nu\mu} = -\Lambda\, g^{\nu\mu}$, where Λ is the cosmological constant, is called Dark Energy. A paper from AD 2021 introduces the hypothesis that Dark Energy is produced by Dark Matter [3]. Expressed in a simple way: Dark Energy is Dark Matter!

VI. ADDITIONAL FACTS

Consider a cloud of dust and an astronaut floating in weightlessness near the edge of this cloud, but inside the cloud. The gravity shrinks the cloud in size, and so the astronaut must be able to measure a slight compression of his body during the fall towards the center of the cloud: due to the gravitational collapse the astronaut is being compressed together with the cloud.

However, in Newton's worldview, the gravity at the feet of the astronaut is stronger than the gravity at the head, so the astronaut is being spaghettified. The spaghettification was indeed observed recently [4]. But according to my own calculations, this spaghettification happens only halfway down. After that, size-shrinking happens and the astronaut vanishes. Hereby the vanishing happens even outside the curvature singularity, which is at the center.

Due to vanishing, Einstein's equations have to be mathematically fixed. This is the role of Dark Matter which is not actual physical matter but a mathematical term put "by hand" to the right-hand side of Einstein's Equations. I called it Virtual Matter. Hereby Dark Energy is a special form of Virtual Matter.

The natural values become bounded in Ref. [5], to avoid infinities and singularities: "the sand a boundary for the sea, an everlasting barrier it cannot cross. The waves may roll, but they cannot prevail; they may roar, but they cannot cross it." Jeremiah 5:22 NIV. The bounded spacetime curvature comes with cutting off the singular areas [of our universe], including the Big Bang. This means that the world began not in the moment of the Big Bang, but later. Prior to the existence of the actual world, there was a Virtual World, Virtual Reality. Remnants of this totally Virtual World are Dark Matter and Dark Energy.

VII. DISCUSSION

Please do not tell me, that I have not presented a matching between the observational data and the theory behind Eq. (11). As the tensor $X^{\nu\mu}$ is a free mathematical parameter consisting of ten functions of space and time, Eq. (11) 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 Virtual Matter. I repeat that the virtual $X^{\nu\mu}$ 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 while the understanding of the problem, but I see no way how the existence of alternatives can harm the value of my results.

But I am disappointed that scientists seem not to be moved by the calculations. I have perfected my math skills during the last 17 years, so I would like to get some comments on those efforts. As an application of the proposed approach to the enigma of Dark Matter, I have given the mathematical proof that a falling body vanishes in the spacetime of a Black Hole. The vanishing violates General Relativity and energy conservation unless the tensor of Virtual Matter $X^{\nu\mu}$ in Eq. (11) is taken into account: the system of visible matter ($T^{\nu\mu}$) and the Virtual Matter ($X^{\nu\mu}$) is being there.

Einstein's equations are not modified by the presence of the Dark Matter and Dark Energy, because all these satisfy equations of form

$$G^{\nu\mu} = 8\pi\,\hat{T}^{\nu\mu}\,, \tag{12}$$

where the right-hand side contains the matter, namely $\hat{T}^{\nu\mu} = T^{\nu\mu} + X^{\nu\mu}$. The left-hand side is the Einstein Tensor. The natural units of measure ($c = 1,\ G = 1$) were used.

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 this year will come 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?

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[1] A. P. Lightman, W. H. Press, R. H. Price, S. A. Teukolsky, "Problem Book in Relativity and Gravitation," Princeton University Press, Princeton, 1975.

[2] Thibaut Josset, Alejandro Perez, and Daniel Sudarsky, "Dark Energy from Violation of Energy Conservation", Phys. Rev. Lett. 118, 021102 (2017).

[3] Karoline Loeve, Kristine Simone Nielsen, Steen H. Hansen, "Consistency Analysis of a Dark Matter Velocity-dependent Force as an Alternative to the Cosmological Constant", ApJ 910, 98 (2021), arXiv:2102.07792 [astro-ph.CO].

[4] M. Nicholl, et.al. "An outflow powers the optical rise of the nearby, fast-evolving tidal disruption event AT2019qiz," Mon. Not. R. Astr. Soc. 499, 482–504 (2020).

[5] Dmitri Martila, Is nature bounded?, 2020.

[6] Pokémon Go is a 2016 augmented reality (AR) mobile game developed and published by Niantic in collaboration with Nintendo and The Pokémon Company for iOS and Android devices. The game uses mobile devices with GPS to locate, capture, train, and battle virtual creatures, called Pokémons, which appear as if they are in the player's real-world location.

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

[8] Dmitri Martila, New results on vanishing, 2020