foundations

MDPI

Communication

Possible Observational Evidence for the Existence of a Parallel Universe

Eugene Oks

Physics Department, Auburn University, 380 Duncan Drive, Auburn, AL 36849, USA; goks@physics.auburn.edu

Abstract: Many totally different kinds of astrophysical observations demonstrated that, in our universe, there exists a preferred direction. Specifically, from observations in a wide range of frequencies, the alignment of various preferred directions in different data sets was found. Moreover, the observed Cosmic Microwave Background (CMB) quadrupole, CMB octopole, radio and optical polarizations from distant sources also indicate the same preferred direction. While this hints at a gravitational pull from the "outside", the observational data from the Plank satellite showed that the bulk flow velocity was relatively small: much smaller than was initially thought. In the present paper we propose a configuration where two three-dimensional universes (one of which is ours) are embedded in a four-dimensional space and rotate about their barycenter in such a way that the centrifugal force nearly (but not exactly) compensates their mutual gravitational pull. This would explain not only the existence of a preferred direction for each of the three-dimensional universes (the direction to the other universe), but also the fact that the bulk flow velocity, observed in our universe, is relatively small. We point out that this configuration could also explain the perplexing features of the Unidentified Aerial Phenomena (UAP), previously called Unidentified Flying Objects (UFOs), recorded by various detection systems—the features presented in the latest official report by the US Office of the Director of National Intelligence. Thus, the proposed configuration of the two rotating, parallel three-dimensional universes seems to explain both the variety of astrophysical observations and (perhaps) the observed features of the UAP.

Keywords: parallel universes; multiverse; preferred direction in the universe; bulk flow; four spatial dimensions

Citation: Oks, E. Possible Observational Evidence for the Existence of a Parallel Universe. *Foundations* **2022**, *2*, 1–5. https://doi.org/10.3390/foundations2010001

Academic Editors: Kazuharu Bamba and Martin Bohner

Received: 19 November 2021
Accepted: 22 December 2021
Published: 23 December 2021

1. Introduction

The hypothesis for the existence of a parallel universe or universes (in the latter case called multiverses) has proponents and opponents among astrophysicists, e.g., see works [1–6] and references therein. The primary argument against this hypothesis was the lack of the observational evidence. In response, the proponents theorized (at different times) that the following two kinds of observations might constitute such evidence.

One theory was based on an early observation of "bulk flow" (i.e., a stream of galaxy clusters moving in the same direction), where the bulk flow velocity was found to be >4000 km/s [7]. These observations could be interpreted as evidence for the existence of a parallel universe. However, later, more precise observations (from the Plank satellite) revealed that the average clusters' velocities are "compatible with zero", being at the level of 120–160 km/s [8]. The authors of paper [8] wrote that this "constitutes an unprecedented and valuable confirmation of a prediction of the standard cosmological scenario"; therefore, this proposed evidence for the existence of a parallel universe should be discarded.

Another theory was that the observed cold spot in the Cosmic Microwave Background (CMB) radiation (nestled in the constellation Eridanus) is the remnant of a collision between our universe and another "bubble" universe during an early inflationary phase, e.g., see review [9] and references therein. Another hypothesis [10] was that the cold spot could be the imprint of another universe beyond our own, caused by quantum entanglement between universes before they are separated by cosmic inflation. However, a more thorough

analysis of data from the WMAP (Wilkinson Microwave Anisotropy Probe) and from the Plank satellite, which has a resolution three times higher than WMAP, did not reveal any statistically significant evidence for such a bubble universe collision [11–13].

In the present paper we show that the existing observations, astrophysical or otherwise, might actually constitute proof for the existence of a parallel universe.

2. Possible Observational Evidence

Many totally different kinds of astrophysical observations demonstrated that, in our universe, there exists a preferred direction (called the "axis of evil" in paper [14]; see the review [15] and references therein). In particular, the author of the review [15] wrote:

"A very curious feature of SI [Statistical Isotropy] violations is the alignment of various preferred directions in different data sets. Several observations at wide range of frequencies suggest a preferred direction pointing roughly towards the Virgo supercluster, which is close to the direction of the observed CMB dipole. . . . Furthermore, the observed CMB quadrupole, CMB octopole, radio and optical polarizations from distant sources also indicate a preferred direction pointing roughly towards Virgo. . . . Statistical isotropy would imply that these are independent of one another as well of other multipoles, such as the dipole. However the preferred axis of both these multipoles points approximately in the direction of the CMB dipole. . . . This is rather surprising!"

It should be noted that the CMB dipole can be interpreted as the peculiar motion of the Earth toward the CMB. However, the CMB quadrupole and CMB octupole cannot be interpreted in this way.

Thus, the existence of the preferred direction (or axis) in our universe is undisputable. This hints at a gravitational pull from the "outside". However, the observational data from the Plank satellite showed (according to paper [8]) that the bulk flow velocity was no more than 160 km/s, i.e., much smaller than the previous observational result of >4000 km/s, and thus the actual gravitational pull from the outside was much smaller than was initially thought.

There is a possible way to reconcile the undisputable existence for the preferred direction of our universe with the relative smallness of the gravitational pull from the outside. Let us consider two three-dimensional universes (one of which is ours) embedded in a four-dimensional space. (By this, we mean only spatial dimensions.) The two universes rotate about their barycenter in such a way that the centrifugal force nearly (though not exactly) compensates their mutual gravitational pull. In this configuration, within each of the three-dimensional universes, there would be a preferred direction: the direction to the other universe. Additionally, in this configuration, the bulk flow velocity (in each of the universes) would be relatively small because the centrifugal force nearly compensates the gravitational force.

This scenario seems to offer a possible explanation for the above astrophysical observations; therefore, it seems to be self-sufficient. Nevertheless, it should be mentioned that there could also be non-astrophysical evidence for this scenario, as presented below.

Paper [16] focused on the following three perplexing features of Unidentified Aerial Phenomena (UAP), previously called Unidentified Flying Objects (UFOs), from the latest official report by the US Office of the Director of National Intelligence [17], where, out of 144 relatively resent observations of UAP by the US military recorded by various detection systems, 143 remained unexplained. First, some UAP demonstrated accelerations (measured by detection systems) of about 700 g. Humans, even those who are astronauts, can stand the acceleration of no more than about 10 g. Second, UAP can both appear suddenly and disappear suddenly (almost instantaneously), which is impossible for man-made objects. Third, these observed UAP were capable of traveling back and forth in air and water, without any significant change of the dynamics, which is also impossible for man-made objects.

For a more visual presentation of that author's main idea, one of his papers [16] first discussed the following. If an experimentalist shone a laser beam on a distant surface

(e.g., on the surface of the Moon) and rotate the laser with some angular velocity, the bright spot can travel across the distant surface with a very large linear velocity, even exceeding the speed of light. (No physical law would be violated because it is the information that cannot be transmitted faster than the speed of light, while the bright spot cannot transmit any information from one place on the surface to another.)

If the experimentalist sharply changed the direction of the motion of the laser, the bright spot on a distant surface would exhibit an extremely sharp turn. If a hypothetical, two-dimensional observer residing on this surface calculated the "acceleration" of this "object" during the extremely sharp turn, the observer would achieve a very large value for this "acceleration", a number far exceeding the technological capabilities of the observer's community.

If the experimentalist (on the Earth) initially shone the laser beam parallel to a distant surface, and then abruptly changed the direction of the beam to hit the surface, the two-dimensional observer on this surface would register a sudden appearance of the bright spot. If later on, the experimentalist abruptly changed the direction of the laser beam to be parallel to the surface, that observer would register a sudden disappearance of the bright spot. In both cases, the observer would qualify this as being beyond the technological capabilities of the observer's community.

Further, let us picture that on that surface there are dry regions (the "air") and wet regions (the "water"). The bright spot can move through the "air", then through the "water", then again through the "air", without any change in its velocity (the velocity controlled by the motion of the laser in the third dimension). The two-dimensional observer on that surface would again qualify this as being beyond the technological capabilities of the observer's community.

At this point in paper [16], the following was written.

"Now let us add an extra spatial dimension both to the "surface" and to the space, from which the light is shined. Now the "surface" becomes our three-dimensional world, into which the light is incoming from the fourth spatial dimension. In our world we see a three-dimensional "bright spot". This "bright spot" is the projection of the light coming from the four-dimensional world on the three-dimensional "screen", the "screen" being our three-dimensional world."

Clearly, in this situation, all of the above three perplexing features of the three-dimensional "bright spot" would be observed and registered by detection systems, with features that are far beyond our technological capabilities, and we would consider such three-dimensional "bright spots" to be UAP. In other words, there is an explanation for all three perplexing features of the observed UAP; they are the three-dimensional projections of the light entering our world from the fourth dimension. In paper [16] the following was written:

"By varying the intensity distribution of the cross-section of the light beam at the source (for example, by using various filters), it would be possible to create any shape and form of the three-dimensional projection that we observe, including the shape of "flying saucers" and so on. By varying color filters or their combinations, it would be possible to make the three-dimensional projection of any color or their combinations."

Further in paper [16], it was explained that the detailed information on the properties of the electromagnetic radiation in four spatial dimensions was provided in paper [18]. According to paper [18], the only one difference of the electromagnetic wave in four spatial dimensions, compared to the electromagnetic wave in three spatial dimensions, is that, in the four-dimensional case, it is intertwined with a weak oscillatory gravitational field (the gravitational field oscillates in the direction of the propagation of the electromagnetic wave). As for the electric and magnetic components of the four-dimensional electromagnetic wave, they are the same as the three-dimensional world.

In paper [16], it was emphasized that, as of now, no new physical laws has been introduced: everything was based on the standard physics. Next in paper [16], the following was written:

"Next, it might seem that since the light is coming from the world of four spatial dimensions, then the source of light should be controlled by four-dimensional intelligent creatures (this would belong to realm of science fiction). However, this does not have to be the case . . . the source of light could be located and controlled in a parallel three-dimensional world by three-dimensional relatively advanced civilization that developed the capability to manipulate the electromagnetic radiation in the way described above. By projecting the light into our three-dimensional world and detecting the reflected light, they monitor our technological capabilities."

Then, in paper [16], the above scenario was compared to the only existing alternative explanation for 143 unexplained UAP from the aforementioned official report—that the unexplained UAP could be drones. The perplexing features of these drones hint to their extra-terrestrial origins. There are three shortcomings of the drone hypothesis compared to the scenario where the UAP are the three-dimensional projections.

First, since our astrophysicists have not yet detected any extraterrestrial civilization located within hundreds of light years from the Earth, the advanced civilization controlling the extra-terrestrial drones would receive the many hundreds years or even in thousands years into the future. In contrast, in the scenario where the UAP are the three-dimensional projections, the information carried by the reflected light, could reach the origin of the light in just few years or less, since the parallel three-dimensional world could be just few light years (or less) away from our three-dimensional world across the four-dimensional space. Clearly, it would make much more sense to monitor our technological capabilities with just a few years of delay, as opposed to monitoring them with the delay of hundreds or thousand years.

Second, in the scenario where the observed UAP are extraterrestrial drones, the extraterrestrial civilization would be extremely advanced; otherwise, it would not be able to make spacecrafts that can withstand the acceleration of 700 g and can interchange the motion in the air and under water without any significant change of the velocity. In contrast, in the scenario of the UAP being the three-dimensional projections, it would be sufficient for the other civilization to be only slightly advanced—just capable of manipulating the electromagnetic radiation in the way described above.

Third, but most important: the scenario of extraterrestrial drones cannot explain the sudden, almost instantaneous appearance of the UAP and the subsequent sudden, almost instantaneous disappearance of the UAP. In contrast, in the scenario with the UAP being the three-dimensional projections, this perplexing feature is easy to explain.

Thus, the configuration of two parallel, three-dimensional universes embedded in a four-dimensional space (where they rotate about their barycenter) explains not only all relevant astrophysical observation, but perhaps also the mind-boggling features of the observed UAP (that have no consistent alternative explanation).

3. Conclusions

We started from the undisputable fact that, from various astrophysical observations of very different kinds, our universe has a preferred direction in space. We proposed a configuration where two three-dimensional universes (one of which is ours) are embedded in a four-dimensional space and rotate about their barycenter in such a way that the centrifugal force nearly (but not exactly) cancels out their mutual gravitational pull. This would explain not only the existence of a preferred direction within each of the three-dimensional universes (the direction to the other universe), but also the fact that the bulk flow velocity, observed in our universe, is relatively small.

We pointed out that this configuration could also explain the perplexing features of the UAP recorded by various detection systems—the features presented in the latest official report by the US Office of the Director of National Intelligence. Thus, the proposed configuration of the two rotating, parallel, three-dimensional universes seems to explain both the variety of the astrophysical observation and (perhaps) the observed features of the UAP.

We mention that one of the interpretations of quantum mechanics suggests the existence of parallel universes. It is the many-world interpretation, proposed as early as 1957 [19].

The totality of the astrophysical observations should be emphasized—those proving the existence of the preferred direction in our universe, as well as astrophysical observations where a weak but non-zero bulk flow (i.e., the gravitational pull from the "outside") was measured. This seems by itself to be sufficient for making the proposed configuration of the two rotating, parallel, three-dimensional universes viable. We hope that our work stimulates a further discussion of these issues.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: All data is included in the paper.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Kragh, H. Contemporary History of Cosmology and the Controversy over the Multiverse. *Ann. Sci.* **2009**, *66*, 529–551. [CrossRef]
2. Greene, B. *The Hidden Reality: Parallel Universes and the Deep Laws of the Cosmos*; A.A. Knopf: New York, NY, USA, 2011.
3. Nomura, Y. Physical theories, eternal inflation, and the quantum universe. *J. High Energ. Phys.* **2011**, *2011*, 63. [CrossRef]
4. Ellis, G.F.R. Does the Multiverse Really Exist? *Sci. Am.* **2011**, *305*, 38–43. [CrossRef] [PubMed]
5. Tegmark, M.; Vilenkin, A. The Case for Parallel Universes. *Sci. Am.* **2011**, *305*. Available online: https://www.scientificamerican.com/article/multiverse-the-case-for-parallel-universe/ (accessed on 16 November 2021).
6. Bousso, R.; Susskind, L. Multiverse Interpretation of Quantum Mechanics. *Phys. Rev. D* **2012**, *85*, 045007. [CrossRef]
7. Abate, A.; Feldman, H.A. Detected Fluctuations in Sloan Digital Sky Survey Luminous Red Galaxy Magnitudes: Bulk Flow Signature or Systematic? *Mon. Not. R. Astron. Soc.* **2010**, *419*, 3482–3490. [CrossRef]
8. Ade, P.A.R.; Aghanim, N.; Arnaud, M.; Ashdown, M.; Aumont, J.; Baccigalupi, C.; Balbi, A.; Banday, A.J.; Barreiro, R.B.; Battaner, E.; et al. Plank Intermediate Results XIII. Constraints on Peculiar Velocities. *Astron. Astrophys.* **2014**, *561*, A97.
9. Mackenzie, R.; Shanks, T.; Bremer, M.N.; Cai, Y.-C.; Gunawardhana, M.L.P.; Kovács, A.; Norberg, P.; Szapudi, I. Evidence Against a Supervoid Causing the CMB Cold Spot. *Mon. Not. R. Astronom. Soc.* **2017**, *470*, 2328–2338. [CrossRef]
10. Mersini-Houghton, L. Beyond the Horizon of the Universe. *Nautilus*, 2 January 2014.
11. Feeney, S.M.; Johnson, M.C.; Mortlock, D.J.; Peiris, H.V. First Observational Tests of Eternal Inflation. *Phys. Rev. Lett.* **2011**, *107*, 071301. [CrossRef] [PubMed]
12. Feeney, S.M.; Johnson, M.C.; Mortlock, D.J.; Peiris, H.V. First Observational Tests of Eternal Inflation: Analysis Methods and WMAP 7-Year Results. *Phys. Rev. D* **2011**, *84*, 43507. [CrossRef]
13. Bousso, R.; Harlow, D.; Senatore, L. Inflation after False Vacuum Decay: Observational Prospects after Planck. *Phys. Rev. D* **2015**, *91*, 083527. [CrossRef]
14. Land, K.; Maguijo, J. Examination of Evidence for a Preferred Axis in the Cosmic Radiation Anisotropy. *Phys. Rev. Lett.* **2005**, *95*, 071301. [CrossRef] [PubMed]
15. Ghosh, S.; Jain, P.; Kashyap, G.; Kothari, R.; Nadkarni-Ghosh, S.; Tiwari, P. Probing Statistical Isotropy of Cosmological Radio Sources using Square Kilometre Array. *J. Astrophys. Astron.* **2016**, *37*, 25. [CrossRef]
16. Oks, E. Explaining Mind-Boggling Features of UFOs from the Physical Point of View. *Intern. Rev. Atom. Mol. Phys.* **2021**, *11*, 115–117.
17. Office of the Director of National Intelligence. Preliminary Assessment: Unidentified Aerial Phenomena. 2021. Available online: https://www.dni.gov/files/ODNI/documents/assessments/Prelimary-Assessment-UAP-20210625.pdf (accessed on 16 November 2021).
18. Corben, H.C. A Classical Theory of Electromagnetism and Gravitation. *Phys. Rev.* **1946**, *69*, 225–234. [CrossRef]
19. Everett, H. Relative State Formulation of Quantum Mechanics. *Rev. Mod. Phys.* **1957**, *29*, 454–462. [CrossRef]