How mind-boggling features of UFOs can be explained from the physical point of view: Prospective applications

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Typical look of UFOs. Credit: Eugene Oks, Author provided

Why are there just 18 letters in the English alphabet? Because E.T. flew away riding a UFO with the CIA in pursuit.

The mysterious UFOs! The recent official report on UFOs by the U.S. Office of the Director of National Intelligence states that out of 144 relatively recent observations of UFOs by the U.S. military, recorded by various detection systems, 143 remained unexplained.

The idea I would like to present (published in my research paper of 2020 in the peer-reviewed journal *International Review of Atomic and Molecular Physics*) provides a physical explanation of the three most mind-boggling features of these observed UFOs. First, some UFOs showed accelerations (measured by detection systems) of about 700 g, that is, about 700 times the acceleration of freefall at the surface of the Earth. Humans, even those who trained for space flights, can stand the acceleration of no more than about 10 g. Also, any man-made equipment would be destroyed at the acceleration of about 20 to 30 g.

Second, UFOs can appear suddenly, almost instantaneously. Also, they can disappear suddenly, almost instantaneously. Man-made aircraft cannot do this.

Third, these observed UFOs were capable of traveling in air and water, back and forth, without any significant change of the dynamics. Man-made aircraft cannot do this.

Before presenting the primary point of my idea, let us first discuss the following. When you shine a flashlight at a wall, you see the bright spot the flashlight makes on the wall. If you would move the flashlight, the bright spot on the wall moves.

Specifically, if you would make a rotational motion with the flashlight and the wall is relatively distant, the bright spot could move quickly across the wall. This is because the linear velocity of the bright spot across the wall is equal to the product of the angular velocity of the rotation of the flashlight and the distance between the flashlight and the

wall. The greater the distance, the greater is the linear velocity of the bright spot across the wall. For example, when a laser beam is directed at the moon (as in some actual experiments), and the laser is rotated with some angular velocity, the bright spot can travel across the moon's surface with a very large linear velocity—even exceeding the speed of light.

At first glance, this might seem to violate the physical law that objects cannot move faster than the speed of light. However, a more rigorous formulation of this physical law is that any information cannot be transmitted faster than the speed of light. A bright spot from a beam of light on any surface (whether on a wall or on the moon) cannot transmit any information from one location on the surface to another. Therefore, there is no restriction on the linear velocity of the bright spot.

It should be emphasized that the light reflected from the surface does carry some information that can be received by your eye or by a detector. For example, if you shine a flashlight on a wall at the location where there is an insect, the reflected light carries back to you the information about the existence of this insect and about its movements. The surface is two-dimensional. The electromagnetic wave (the light), which carries the information to you, propagates in the extra (third) dimension compared to the dimensions of the surface (and it propagates with the speed of light).

If two-dimensional intelligent creatures lived on a surface illuminated by a light beam, they would observe a very fast motion of the bright spot across the surface. However, as the bright spot moves from its original location where there was a two-dimensional insect to another location, the intelligent creatures would not learn that that at the original location of the bright spot there was an insect. No information would be carried by the bright spot from one location at the surface to another.

Now, imagine that while shining a flashlight or laser on a distant surface, you sharply changed the direction of the motion of the source of light—for example, you moved it downward and then abruptly moved it sideways. In this situation, the bright spot on the distance surface would make an extremely sharp turn. If the two-dimensional intelligent creatures living on this surface consider the bright spot as a material object and calculate the "acceleration" required for this "object" to make such an extremely sharp turn, they would come up with a really huge number for this "acceleration"—the "acceleration" far exceeding the capability of their technology.

Next, imagine that you were shining a flashlight or laser parallel to the surface and then sharply changed the direction of the light beam to hit the surface. The two-dimensional intelligent creatures living on this surface would observe a sudden appearance of the bright spot. Then, after a while, you sharply change the direction of the beam to be parallel to the surface. The two-dimensional intelligent creatures would observe a sudden disappearance of the bright spot. So they would qualify the sudden appearance and disappearance of this "object" as something far exceeding the capability of their technology.

Further, imagine that on this two-dimensional surface there are dry regions (the "air") and wet regions (the "water"). The bright spot can travel through the "air," then through the "water," then again through the "air" without changing its speed (controlled by the motion of your light source). The two-dimensional intelligent creatures, living on this surface, would consider this feature of the bright spot once again as something far exceeding the capability of their technology.

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.

A rotational motion of the source of light would cause an extremely rapid motion of the three-dimensional "bright spot." An abrupt change of the direction of the motion of the source of light would cause the three-dimensional 'bright spot" to make an extremely sharp turn. As we follow the motion of the "bright spot" via detectors and calculate the "acceleration" required for this "object" to make such an extremely sharp turn, we would get a really huge number for this "acceleration," such as, for example, the "acceleration" of about 700 g—the "acceleration" far exceeding the capabilities of our technology.

Next, if the source initially directed the light beam parallel to our three-dimensional world (in the four-dimensional space) and then sharply changed the direction of the light beam to hit our world, we would register a sudden appearance of the three-dimensional bright spot (the "object"). Then, after a while, if the source of light sharply changed the direction of the light beam to be parallel to our world, we would register a sudden disappearance of the "object." We would qualify these phenomena as something far exceeding the capability of our technology.

Further, as the light source rotates, its projection on the three-dimensional "screen" can travel both through the dry parts of the "screen" (the air) and through the wet parts of the "screen" (the water) without changing its speed. This is similar to the lower-dimensional situation discussed above: The light from a three-dimensional world shining on the two-dimensional screen/surface. Observing this via detectors, we would consider this feature of the three-dimensional "object" (the bright spot) once again as something far exceeding the capability of our technology.

By now you have probably figured out where I am heading. In my research paper of 2020, mentioned above, I proposed that that those UFOs, whose perceived motion far exceeds the capability of our technology (such as 143 out of 144 UFOs analyzed in the official report by the U.S. Office of the Director of National Intelligence), could be three-dimensional projections of light incoming from the fourth dimension. 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.

This raises a question: What is light, which is electromagnetic radiation, in four dimensions? The information sufficient for answering this question has been provided, for example, by Corben in his paper published in 1946 in the *Physical Review* (vol. 69, page 225). He showed that in the world of four spatial dimensions, the electromagnetic wave propagates perpendicular to the plane of the oscillating electric and magnetic fields of this wave—as in our three-dimensional world. The only difference is that there is also a weak gravitational field oscillating in the direction of the propagation of the electromagnetic wave.

Note that up to this point, the discussion was based on the standard physics without introducing any new physical laws.

Next, it might seem that since the light is coming from a 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. In the physics literature, there are lots of papers discussing the possibility of *parallel* three-dimensional worlds (parallel universes). So the source of light

could be located and controlled in a parallel three-dimensional world by a three-dimensional, relatively advanced civilization that developed the capability to manipulate 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.

Let us compare this scenario with the only other hypothesis raised for explaining 143 unexplained UFOs from the official report released by the US Office of the Director of National Intelligence. At best, these unexplained UFOs are proposed to be drones. The mind-boggling features of the motion of these drones point out to their extraterrestrial origin. However, the hypothesis of extraterrestrial drones has at least the following three disadvantages compared to the scenario of the UFOs being the three-dimensional projections.

First, if the observed UFOs were extraterrestrial drones, the advanced civilization controlling such drones would receive the information in hundreds or even thousands of years—because so far, we have not detected any extraterrestrial civilization separated from us by a smaller number of light-years across our three-dimensional universe. In the scenario of the UFOs being three-dimensional projections, the parallel three-dimensional world could be just few light-years (or less) away across four-dimensional space. Therefore, the information carried by the reflected light could reach those who control the source of light in just few years or less. Monitoring our technological capabilities with just a few years delay makes more sense than doing this with the delay of hundreds or thousand years.

Second, if the observed UFOs were extraterrestrial drones, it would require the extraterrestrial civilization to be unbelievably advanced—capable of constructing spacecraft that withstand 700 g acceleration and interchanging the travel in the air and under water without any significant variation of the speed. In distinction, in the

scenario of the UFOs as three-dimensional projections, the other civilization has only to be relatively advanced—just capable of manipulating electromagnetic radiation in the way described above.

Most importantly, the hypothesis that observed UFOs are extraterrestrial drones fails to explain the sudden, almost instantaneous appearance of these objects and their subsequent sudden, almost instantaneous disappearance. In distinction, the scenario in which the UFOs are three-dimensional projections easily explains this.

What about prospective applications of my idea that what we call UFOs are three-dimensional projections of four-dimensional electromagnetic radiation? Military aircraft could be equipped with an array of reflective elements capable of reflecting the electromagnetic radiation in the infrared, visible and ultraviolet ranges. When a military aircraft encounters a UFO, it should engage the reflective array and direct a part of this electromagnetic radiation to a ground-based research lab. Then, researchers in the lab can use sensors to determine whether this radiation contains also a gravitational radiation component, which is a distinctive feature of four-dimensional electromagnetic radiation. If the gravitational component could be detected, this would constitute a definitive proof of my physical explanation of UFOs. Now, let me outline prospective applications.

(1) For many decades, there has been an ongoing project called Search for Extra Terrestrial Intelligence (SETI). Typically, the SETI team modulates laser radiation to carry a signal containing fundamental mathematical quantities, such as the number pi, the number e (the base of natural logarithms), the Euler constant, and so on. Then they shoot the laser beam in random directions in the universe, hoping that by chance, the beam might be detected and decoded by an extraterrestrial civilization, and that this civilization would send back another signal, and in this way, the communication between the two civilizations would be

established. However, so far, a return signal has never been received over the many years of the existence of SETI.

In distinction, researchers in the ground lab who studied the gravitational component of the radiation reflected to the lab by the aircraft can modulate the radiation in a way similar to what the SETI team does (and thus making it to carry the signal), and then use their array of reflective elements and shoot it back to the reflectors on the aircraft, which in turn would reflect it back to where it came from originally. Compared to the SETI project, the advantage is that the signal would definitively go back to the existing extraterrestrial civilization that created this technology, and the contact between the two civilizations would be more definitely established.

(2) Researchers in that ground lab would study in detail this new physical phenomenon that can revolutionize our technological capabilities—pretty much, for example, as Michael Faraday's discovery of electromagnetic induction, which revolutionized technology. But when he discovered electromagnetic induction, and the queen asked him what practical use of his discovery was, he famously replied: "And what is the practical use of a just born child?" I am sure that the experimental confirmation/discovery of the radiation containing the intertwined electromagnetic and gravitational components would lead to technological breakthroughs beyond imagination, and these breakthroughs would be multidisciplinary.

Actually, I hope that both my research paper on this subject might motivate researchers to engage in such studies.

Let me finish with a joke: A man sat on a plane next to a theoretical physicist. The man asked the physicist how he was able to visualize things in four-dimensional space. The physicist replied, "That's easy. First I visualize it in n-dimensional space and then I just let n be equal to

4."

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More information: Eugene Oks. Explaining Mind-Boggling Features of UFOs from the Physical Point of View. *International Review of Atomic and Molecular Physics* (2021) serialsjournals.com/abstract/49147_7.pdf

Bio:
Eugene Oks received his Ph.D. degree from the Moscow Institute of Physics and Technology, and later the highest degree of Doctor of Sciences from the Institute of General Physics of the Academy of Sciences of the USSR by the decision of the Scientific Council led by the Nobel Prize winner, academician A.M. Prokhorov. According to the Statute of the Doctor of Sciences degree, this highest degree is awarded only to the most outstanding Ph.D. scientists who founded a new research field of a great interest. Oks worked in Moscow (USSR) as the head of a research unit at the Center for Studying Surfaces and Vacuum, then—at the Ruhr University in Bochum (Germany) as an invited professor, and for the last 30 years—at the Physics Department of the Auburn University (USA) in the position of Professor. He conducted research in 5 areas: atomic and molecular physics, astrophysics, plasma physics, laser physics, and nonlinear dynamics. He founded/co-founded and developed new research fields, such as intra-Stark spectroscopy (new class of nonlinear optical phenomena in plasmas), masing without inversion (advanced schemes for generating/amplifying coherent microwave radiation), and quantum chaos (nonlinear dynamics in the microscopic world). He also developed a large number of advanced spectroscopic methods for diagnosing various laboratory and astrophysical plasmas—the methods that were then used and are used by

many experimental groups around the world. He recently revealed that there are two flavors of hydrogen atoms, as proven by the analysis of atomic experiments; there are also possible astrophysical proofs—from observations of the 21 cm radio line from the early Universe and from the observed distribution of dark matter in the Universe. He showed that dark matter or at least a part of it can be represented by the second flavor of hydrogen atoms. He published about 500 papers and 10 books, including the books "Plasma Spectroscopy: The Influence of Microwave and Laser Fields," "Stark Broadening of Hydrogen and Hydrogenlike Spectral Lines in Plasmas: The Physical Insight," "Breaking Paradigms in Atomic and Molecular Physics," "Diagnostics of Laboratory and Astrophysical Plasmas Using Spectral Lineshapes of One-, Two, and Three-Electron Systems," "Unexpected Similarities of the Universe with Atomic and Molecular Systems: What a Beautiful World," "Analytical Advances in Quantum and Celestial Mechanics: Separating Rapid and Slow Subsystems," "Advances in X-Ray Spectroscopy of Laser Plasmas," "Simple Atomic and Molecular Systems: New Results and Applications," and "Advances in the Physics of Rydberg Atoms and Molecules." He is the Editor-in-Chief of the Physical Sciences section of the journal *Foundations*. He is a member of the Editorial Boards of six other journals: *Symmetry*, *American Journal of Astronomy and Astrophysics*, *Dynamics*, *Open Journal of Microphysics*, *Physics International*, and *Open Physics*. He is a member of the Reviewers Board of the journal *Atoms*. He is also a member of the International Program Committees of the two series of conferences: Spectral Line Shapes, as well as Zvenigorod Conference on Plasma Physics and Controlled Fusion.

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