



Avi Loeb

**Extraterrestrial:
The First Sign of Intelligent Life Beyond
Earth**

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The SPIEGEL magazine's main headline asked "Are we still alone?" in issue Nr. 26, June 26, 2021. In the article Avi Loeb, Harvard professor is quoted to take U.S. fighter pilot sightings of UAP's (unidentified aerial phenomena) seriously: "As scientists, we are obliged to take this possibility seriously and not to laugh at it from the start". [1]

Although, as the book title might suggest it has to be pointed out that Avi Loeb's book does not deal with science fiction, but is in the tradition of "honest a goodness" science research.

He caused a sensation with the thesis that an extraterrestrial artifact might have crossed our solar system. What he meant was that "Oumuamua", a "cigar-shaped" object from deep space flew past Earth in 2017 was of artificial origin. Loeb's colleagues mostly classify Oumuamua as a comet on its long interstellar voyage, while Loeb says its shape and orbit speak for an artificial structure. It could have been some kind of scouting probe or space debris from another civilization.

His book therefore starts with his believe that in 2017 evidence passed through our solar system that supports his hypothesis, and the answer to his belief is "yes" in this book. "I look at that evidence as test for that hypothesis and ask what consequences might follow if scientists gave it the same credence they give to conjectures about supersymmetry, extra dimensions, the nature of dark matter and the possibility of a Multiverse".

The question is: Are we ready? What would be the consequences?

Avid Loeb's hypothesis is based on the fact that during 7 days in September 2017 we could observe and track the visit of the first interstellar object to our solar system. Oumuamua, coming from the Lyra star constellation moving out of our solar system towards Pegasus provides evidence enough backing the hypothesis that Oumuamua was a "scout" from another civilization.

Why not – he argues: our civilization was able to send already five objects out of our solar system into interstellar space, Pioneer 10 & 11, Voyager 1 & 2 and New Horizons – assuming the quest for exploration also for other civilizations.

Step by step he explains and proves his reasoning with the "exotic" behavior of the interstellar object.

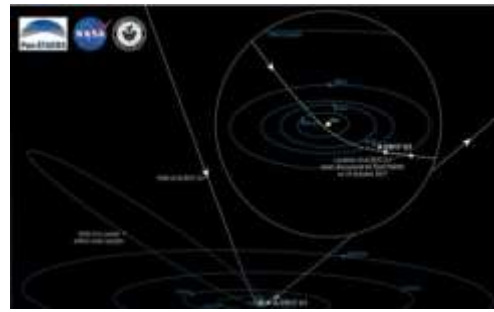
The facts:

"Oumuamua is a small object estimated to be between 100 and 1,000 meters (300 and 3,000 ft) long, with its width and thickness both estimated to range between 35 and 167 meters (115 and 548 ft). It has a red color, similar to objects in the outer Solar System. Despite its close approach to the Sun, Oumuamua showed no signs of having a coma, but it did exhibit non-gravitational acceleration. Nonetheless, the object could be a remnant of a disintegrated rogue comet (or exocomet), according to astronomer Zdenek Sekanina. The object has a rotation rate similar to the average spin rate seen in

solar system asteroids, but many valid models permit it to be more elongated than all but a few other natural bodies. While an unconsolidated object (rubble pile) would require it to be of a density similar to rocky asteroids, a small amount of internal strength similar to icy comets would allow a relatively low density. Oumuamua's light curve, assuming little systematic error, presents its motion as tumbling, rather than spinning, and moving sufficiently fast relative to the Sun that it is likely of an extrasolar origin. Extrapolated and without further deceleration, Oumuamua's path cannot be captured into a solar orbit, so it would eventually leave the solar system and continue into interstellar space. Oumuamua's planetary system of origin and the age of its excursion are unknown.” [2]



Oumuamua (yellow circle) in max. resolution [3]



Trajectory , two different view angles [3]

Anomalies:

As the shape of the object could not be determined (resolution too weak) other means were used like the reflected sunlight. Eight hours (8 hrs) for one rotation was determined, this is unusual for comets or asteroids and a ratio of 100:10 in length and width was calculated which points to a cigar shaped or very flat, a flattened oval like body.

Another puzzling observation was that the surface of the object must be very reflective, as shiny metal, rather than usual rocky or icy surfaces.

However, the most astonishing effect was a measured, but unexplainable non-gravitational acceleration pushing the object away from the Sun with no mass nor spin/tumbling rate changes detectable. Any outgassing was not observable and the acceleration change by outgassing particles would have caused a loss of 1/10 of its previous mass which would have changed the tumbling/spin rate. Avi Loeb and a colleague came up with the conclusion that the only explanation of the acceleration was that Oumuamua was behaving like a (Sun-) light sail and calculations revealed that the surface must be only 1mm thick to produce this effect. However nature can not produce such a device – so the Loeb’s conclusion was that Oumuamua could be an object of artificial origin i.e. of an extraterrestrial civilization.

Are we ready, what if...

In the last part of the book Avi Loeb enters in a passionate plea for scientists to dare to think outside of broken-in paths and retain the curiosity of a child.

If we could have obtained a high-res image of Oumuamua that demonstrates beyond reasonable doubt that this object was technological debris from an extraterrestrial civilization – what would have followed? According to Loeb it would have an influence not only on astrophysics but also on science, philosophy, religion, human psychology and education. It would also teach us some modesty with respect to our place in the Universe.

Similar to Pascal’s famous wager about the existence of God, Loeb offers an “Oumuamua wager”: Humanity bets its future on whether Oumuamua is extraterrestrial technology or not.

“The promise of betting right exploring out among the stars for the life we expect to find there are the heavens themselves, betting wrong and too late could hasten our extinction.”

It only requires the belief an intelligence other than our own exists –and it is not only requiring belief as in Pascal’s wager, but is backed up by some evidence.

In my opinion Avi Loeb’s book is an intelligent, intellectual sound thought experiment which deserves as much credence as is given to conjectures like the possibility of a Multiverse.

Reading the book is very worthwhile your time and you will learn much about the nature of modern science’s “gold standard” being based on hypotheses backed up by observable evidence or falsified, but you also learn a lot about humility and ego of the protagonists.

Measured against this standard Avi Loeb’s hypothesis of an extraterrestrial artifact in my opinion is as valid as the “fluffy body”, a very lightweight and 'fluffy' conglomerate of dust and ice grains or a body based on nitrogen ice as suggested by other renowned astrophysicists. [2]

Let yourself convince by Avi Loeb to think the unexpected!

References:

[1] Der Spiegel Nr. 26, June 26, 2021

[2] Wikipedia Oumuamua <https://en.wikipedia.org/wiki/%CA%BBOumuamua>

[3]. Karen J. Meech: <https://www.youtube.com/watch?v=rfi3w9Bzwik&t=389s>