


# 'Alien Civilizations Probably Exist, Billions of Years Ahead of Us,' Says Israeli-U.S. Harvard Professor

Astrophysicist Avi Loeb is urging his colleagues to expand their horizons with some sky-high imagination. 'The chances are that we will be encountering alien equipment long before we encounter creatures from other worlds,' he tells Haaretz



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A bronze statue of Giordano Bruno by Ettore Ferrari (1845-1929), in Campo de' Fiori, Rome, Italy. Credit: Jastrow



Masha Zur Glozman



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Following decades of official denials, the U.S. Department of Defense now admits it has no answer to many questions. A report summing up a wealth of evidence from the U.S. Army, due to be published at the end of the month, concludes that the vast majority of the more than 120 unexplained objects observed by the air force and navy over the past 20 years could not be accounted for by any military activity or advanced technology on the part of enemy countries.

“What is true, and I’m actually being serious here, is that there is footage and records of objects in the skies that we don’t know exactly what they are,” former President Barack Obama said on a late-night talk show last month. “When it comes to aliens, there’s some things I just can’t tell you on air.”

That was enough to drive the world crazy and reignite the question: Are we alone in the universe?

From the middle of the 20th century, various efforts have been made to answer the question of whether there is life beyond Earth. The research took two directions: the first, a hunt for signs of simple life-forms, such as algae, lichens or microorganisms; and the second, a search for signs of advanced civilizations.

While the first has gained momentum in recent decades, the search for intelligent life has generally been met with the academic equivalent of a shrug.

Curiosity about the surrounding universe and the life-forms that could exist in it – as well as the ability to imagine it – started a lot earlier.

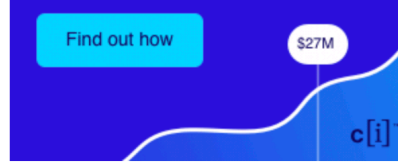


Avi Loeb, an Israeli-American professor of theoretical physics and astronomy and former chair of the astronomy department at Harvard University. Credit: Moti Milrod

**'Equipment can survive over long distances and long periods of time, and equipment can be sent off without any intention of its being used for many years to come'**

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“There are innumerable worlds of different sizes. In some there is neither sun nor moon, in others, they are larger than in ours and others have more than one. ... Here they come into being, there they die, and they are destroyed by collision with one another. Some of the worlds have no animal or vegetable life nor any water.”

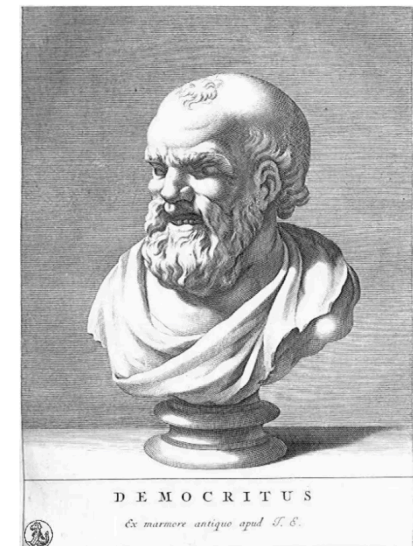
- Is humanity alone in the universe? How we deal with galactic loneliness
- In pursuit of dark matter, an elusive cosmic celebrity
- NASA renews search for aliens, and discoveries are expected in our lifetime
- If true, this could be one of the greatest discoveries in human history

These are the words attributed to the fifth century B.C.E. Greek philosopher-mathematician Democritus, who was known as the “laughing philosopher.”

As developed as the philosophical community of Athens was at the time, an idea like this was pretty daring. For the next 2,000 years, the idea – at least as a scientific hypothesis – was pushed to the side. But in 1584, the Italian philosopher, scientist and astronomer Giordano Bruno published his “Italian Dialogues.” This included an essay in which he defended Nicolaus Copernicus, who had posited that the Earth revolves around the sun, not the other way around.

In another essay, “On the Infinite Universe and Worlds,” he claimed that the stars in the heavens are suns that produce their own light and heat, and have other bodies moving around them. These other worlds “have no less virtue nor a nature different from that of our Earth” and contain animals and inhabitants.

“He wasn’t an especially nice person. Many people didn’t like Bruno,” says [Avi Loeb](#), an Israeli-American professor of theoretical physics and astronomy and former chair of the astronomy department at Harvard University. Loeb is also founding director of Harvard’s Black Hole Initiative and director of the Institute for



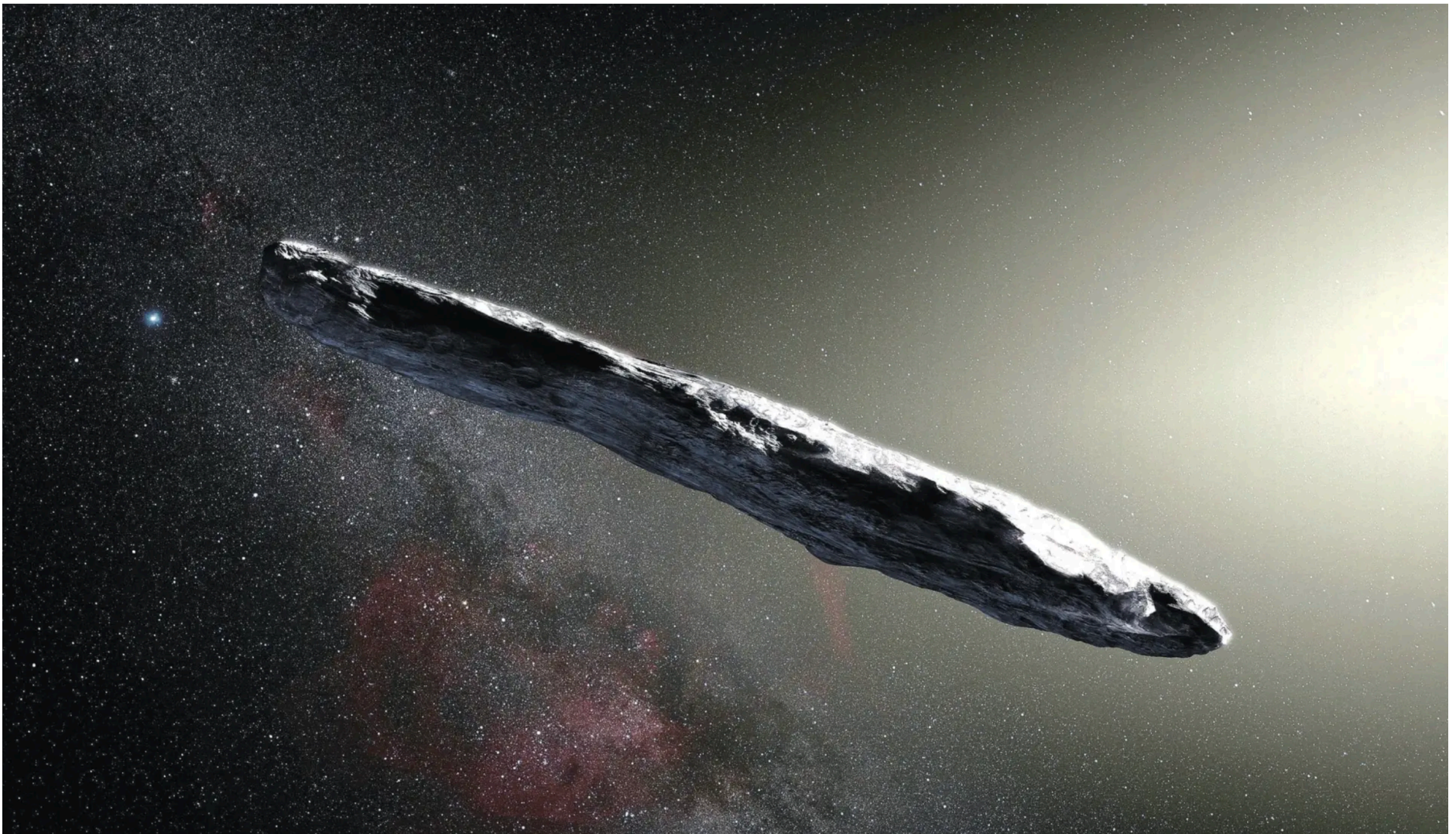
An etching of Fifth century B.C.E. Greek philosopher-mathematician Democritus.



Theory and Computation within the Harvard-Smithsonian Center for Astrophysics.

“He argued that other stars may be like the sun, so there may be planets around them like Earth, and there may very well be life on them. The church resented this, and he was burned at the stake. That was the fate of [Giordano Bruno](#) due to his heresy in the face of church dogma at the time.”

Prof. Loeb knows something about dogma, though the “church” he faces is the scientific community (not that anyone is contemplating an auto-da-fé).





His book, “Alien,” has just been published in Israel by Kinneret Zmora-Bitan Dvir (the English title is “Extraterrestrial: The First Sign of Intelligent Life Beyond Earth”), which explains in clear and simple language the various interpretations of the exciting appearance of Oumuamua, the first-ever interstellar celestial object observed from Earth, which appeared in the heavens in October 2017.

Oumuamua, which means “pioneer,” “navigator” or “explorer” in Hawaiian, wasn’t unique only because it originated from outside our solar system. At least six separate anomalies were observed about it, including its shape, the light it reflected and the path it was taking.

While scientists proposed various theories to explain each of these anomalies separately, Loeb offered one theory that explained them all: Oumuamua is an artificial object, perhaps space garbage from an alien culture.

Despite Loeb’s standing in the scientific community, his proposal was greeted with deep suspicion by his fellow scientists – suspicion Loeb says springs from prejudice.

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**'The universe has existed for 13.8 billion years and most of the stars were formed long before our sun. So, another civilization need only be older than ours to have technology that we are incapable of understanding'**

“What bothers me about the attitude of the scientific community – it’s that these people say, ‘There’s nothing to talk about on this matter until we find exceptional, unambiguous evidence,’” he says, in a video call from his home in Boston. “But if we don’t dedicate resources to uncovering this evidence, we won’t have it. It’s like trampling on the grass and saying, ‘See, the grass isn’t growing.’”

“Academic tenure is supposed to enable scientists to think independently, to take risks and make mistakes sometimes,” he continues. “Instead, when people get tenure, they become more egotistical and take fewer risks. The best way not to take risks is to never verify ideas by experiments and observations.”



Prof. Avi Loeb. 'We arrived relatively late.' Credit: Moti Milrod

Loeb is outraged at the contradiction, and perhaps even the hypocrisy, in the demand for extraordinary evidence before there can be a discussion of alien cultures. The assumption that humanity isn't the only intelligent civilization in the universe seems to him less speculative than theories about additional dimensions or string theory.

“After all, we're here on the Earth, and conditions on billions of planets in the Milky Way are similar to conditions on Earth. It's not speculative to say, 'Under similar conditions, we should get the



same results.' In my opinion, that should be the prevailing view and we should be investing billions of dollars in search of technologies on other planets. That should be what we're doing."

**'Like the gold rush'**

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**'There are scientists who would prefer that everything they see matches what they were expecting, and thus they can remain in their comfort zone and won't have to learn new things'**

The Harvard Black Hole Initiative, which Loeb founded in 2016, works with astronomers, mathematicians, physicists and philosophers. When asked about the role of the philosophers, he smiles. "Their job is to put scientists in their place, if scientists don't present their consideration credibly. [The philosophers] are like the canary in the coal mine," Loeb explains.

Nevertheless, with regard to research on alien civilizations, scientists seem to ignore the greatest thinkers to have dealt with the subject: the giants of science-fiction literature. In the 20th century, they have been joined by the makers of film and television programs that turned sci-fi from a collection of philosophical questions into icons of pop culture, from "[E.T. the Extra-Terrestrial](#)" to "The X-Files."

The most serious science fiction dealt with the most profound ethical, social and philosophical questions about life in the universe. For example, the 1961 book by Polish author Stanisław Lem, "[Solaris](#)," deals with contact with an intelligent entity that humans are unable to define or understand. In the book (which has twice been adapted into a film), humanity has learned how to travel great distances and has even made contact with other civilizations. Now, though, it is confronted with a nut it isn't sure it can crack: a living, intelligent plasma ocean.





Part of an unclassified video taken by Navy pilots that have circulated for years showing interactions with "unidentified aerial phenomena". Credit: HANDOUT - AFP

The book, a literary masterpiece that is unrestrained by the boundaries of genre, describes the despair that grips the handful of scientists aboard a space station trying to pursue their research under conditions of extreme isolation, and unexplained physical and psychological phenomena. Among other things, Lem criticizes the very essence of human science by describing decades of research, data collection and observations that reach no coherent conclusions.

It is hard to say when and why the scientific community began to look disparagingly at the idea that there could be advanced civilizations on other planets.

Research on communication or contact with extraterrestrial civilizations has focused mainly on the search for radio signals. But Loeb says that's not enough and argues that efforts should be expanded to other directions.

"The chances are that we will be encountering alien technology – in other words, equipment – long before we encounter creatures from other worlds," he says. "Equipment can survive over long distances and long periods of time, and equipment can be sent off without any intention of its being used for many years to come."

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**Loeb admits he's not a big sci-fi fan, but concedes the importance of the genre. 'It expands our imagination. It allows us to imagine things we haven't seen yet'**



Loeb again reminds us that “there are tens of billions of systems like the Earth and the sun just in the Milky Way. And there are a trillion galaxies in the near universe. That means there are more planets with conditions like the Earth’s than there are grains of sand in all of the beaches on Earth itself. In other words, there are quite reasonable odds that there are civilizations like ours, even in our galaxy, billions of years ahead of us.

“We arrived relatively late,” he says. “The universe has existed for 13.8 billion years and most of the stars were formed long before our sun. So, another civilization need only be older than ours to have technology that we are incapable of understanding.

“It’s reasonable that older alien civilizations sent out spacecraft, just like we’ve sent out Voyager and New Horizons beyond our solar system,” he adds. “We need to be searching for evidence of the existence of alien civilizations just like we conduct archaeological excavations, looking for anything they may have left behind. We can find evidence for their existence if we discover other bodies like Oumuamua, and if we find them early enough.”



A scene from 2016 movie 'Arrival.' Credit: 21 Laps entertainment / FilmNati

Loeb is pinning his hopes on Chile’s Vera C. Rubin Observatory, which is set to start operating in October 2023 and will be more sensitive than the Pan-STARRS telescope in Hawaii that discovered Oumuamua. “Then, in theory, we could discover an object like that once a month, and with advance warning of a year we could send up

a spaceship that could meet it, photograph it, and maybe even land on it,” he says.

“If we could document such an object, we could easily distinguish between an artificial object and a natural object – and if it’s artificial, we could bring this technology to Earth. As a result of discovering the technology of other cultures, more advanced than ours, we’ll enjoy a scientific boost, and this will have a very high economic value. The moment the field of astroarchaeology opens up, it will be like the gold rush.”

### **Beach vacation**

The book “Roadside Picnic,” by brothers Arkady and Boris Strugatsky, published in the Soviet Union in 1972 (and which inspired the 1979 movie “Stalker” by Andrei Tarkovsky, video games and Manga series), describes an occurrence no less depressing than that of “Solaris.” It begins 13 years after “the Visitation,” a singular, unexplained event in which space vehicles are assumed to have visited Earth, leaving six “zones” that exhibit strange phenomena, mostly fatal, that science cannot explain. These are the focus of an endless hunt for technological artifacts that can serve scientific research, on the one hand, but can also be sold for profit on the black market.

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**'It could be that cultures much more advanced than ours decided deliberately not to make contact with inferior cultures, for fear of undermining their way of life'**

During a drunken conversation one of the characters, Richard Noonan, holds with a philosopher scientist, Dr. Valentine Pilman, toward the end of the book, the two discuss the unanswerable question of what the Visitation had been exactly. Pilman has a few interpretations: Perhaps the aliens sent samples of their material culture so that humanity could learn their technologies before making real contact. Perhaps the visit is still ongoing and the aliens



are continuing to study humans without the latter being aware of it. Or perhaps – and this is the possibility that bothers his interlocutor most of all – the visit was a kind of picnic in which the aliens simply left their trash, like people vacationing on the beach, and never noticed humankind at all.

Pilman is amused by Noonan's stormy response to his suggestions. "For me," he says, "the Visit is first and foremost a unique event that could potentially allow us to skip a few rungs in the ladder of progress. Like a trip into the future of technology. Say, like Isaac Newton finding a modern microwave emitter in his laboratory" (translation by Olena Bormashenko).

When Loeb is asked why the scientific community considers the study of otherworldly intelligent cultures to be so taboo, he recalls a lecture on Oumuamua at Harvard. "When I left it with a colleague of mine, who had worked on stones in the solar system for decades, he said, 'Oumuamua is so strange; it would be better if it didn't exist.' That's the attitude," he says.

"There are scientists who would prefer that everything they see matches what they were expecting, and thus they can remain in their comfort zone and won't have to learn new things," he continues. "But physics deals with nature: It's not a monologue in which we say what nature is meant to be like; it's a dialogue in which we get feedback from nature by experimenting. It also includes a situation in which you see unexpected things, anomalies, and that's the best way to learn something new."



### **Space's trash can**

In 1608, German astronomer and mathematician Johannes Kepler wrote his work "Somnium" ("The Dream" in Latin), in which he described how the Earth would look from the moon. This work is considered by many to be the first work of science fiction, but Kepler never intended it as such. He was applying all the scientific knowledge of his time, but wrote the book this way to evade the



The trailing arms of NGC 2276, a spiral galaxy 120 million light-years away in the constellation of Cepheus captured by the NASA/ESA Hubble Space Telescope. Credit: AFP

critical eye of the Catholic Church, which, as previously noted, tended to burn those who made strange suggestions about what happens in the heavens.

Last month, the current events show “60 Minutes” featured testimony from U.S. military pilots and senior intelligence officials regarding the phenomenon of unidentified flying objects. Intelligence official Luis “Lue” Elizondo, who spent several years heading a special U.S. project to examine “unidentified aerial phenomena,” made it clear in his interview that he wasn’t the person acknowledging the existence of UFOs (which travel at incredible speeds, challenge the Earth’s gravity and have no motors or control panels). It was the U.S. government.

Host Bill Whitaker was incredulous and said it sounded “nutty, wacky.” Elizondo replied that while it did sound crazy, it is real. “The question is, what is it? What are its intentions? What are its capabilities?”

Elizondo made clear that the default is not to decide that these are alien spaceships. Many possibilities have been examined by scientists, engineers, military intelligence officers and others – for example, that this is new Chinese technology or a spy balloon that can reach high altitudes. But all of these theories have been rejected. What remains is the fact that unexplained phenomena are being seen and documented in American airspace.

“It could be that cultures much more advanced than ours decided deliberately not to make contact with inferior cultures, for fear of undermining their way of life, so they’ve isolated themselves,” says Loeb, in the context of the social distancing the coronavirus imposed on humanity. “That doesn’t mean that we can’t learn about them, since they still need to throw their waste into space. And just like journalists who go through the trash cans of Hollywood celebrities to learn about their private lives, we can look at the waste in space.”



Another writer who had a lot of fun with the notion that man is not the center of the universe, or even close to it, was British writer Douglas Adams, author of “The Hitchhiker’s Guide to the Galaxy,” a science fiction work that broke the boundaries of the genre with a supersonic boom.

Despite his uncompromising comedic approach, Adams addressed many of the philosophical questions that come to mind about extraterrestrial cultures.

The book’s famous opening features the demolition of Earth to make way for an interstellar bypass route. The commander of the fleet dispatched to carry this out, Prostetnic Vogon Jeltz, addresses humanity two minutes before the destruction by saying: “There’s no point in acting all surprised about it. All the planning charts and demolition orders have been on display in your local planning department on Alpha Centauri for 50 of your Earth years, so you’ve had plenty of time to lodge any formal complaint and it’s far too late to start making a fuss about it now.”

When Earth files a protest, he replies, “What do you mean you’ve never been to Alpha Centauri? For heaven’s sake mankind, it’s only four light years away you know. I’m sorry, but if you can’t be bothered to take an interest in local affairs, that’s your own lookout. Energize the demolition beams.”

### **Don’t fear error**

Netflix launched the four-part series “Alien Worlds” last December. The show spectacularly describes the possibility of life on different planets across the galaxy. Using computer graphics and conversations with scientists from a variety of fields, it demonstrates how the principles of physics, chemistry and biology might be translated on planets with different conditions.

“Alien Worlds” exemplifies the widening horizon of possibilities when imagination and research collaborate. For example, it



describes a planet that, due to gravity double that of Earth and a dense atmosphere, the main living environment is in the air.

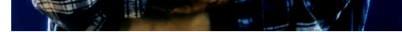
Another episode describes a planet with a tidal locking; due to its proximity to its own sun, it doesn't turn on its axis, which means that half the planet is in perpetual night while the other is perpetual day, producing a thin belt of twilight zone which is where most of life takes place.

The last episode describes a planet on which a very advanced civilization has developed, which is now planning a move to another planet in the same solar system. The episode deals with the possibility of intelligent life other than on Earth, and how it might be possible to communicate with such societies someday.

Loeb admits he's not a big sci-fi fan, but concedes the importance of the genre. "It expands our imagination. It allows us to imagine things we haven't seen yet. There are many examples of technologies that have been developed that were once considered science fiction – like Jules Verne, who came up with submarines in the 19th century," he says. "I have no problem with it at all, I just prefer stories that are based on the laws of nature and do not contradict them."

He nonetheless mentions one movie that he loved: "Arrival" (2016), based on Ted Chiang's "Story of Your Life," a short story that describes how humans succeed, or fail, to communicate with aliens of far greater intelligence who land on Earth in several places at once, and bridge the enormous gaps in capabilities and living conditions.

The successful 1997 movie "Contact," directed by Robert Zemeckis and starring Jodie Foster, based on the 1985 book by astronomer, cosmologist, astrophysicist and astrobiologist Carl Sagan ("He was ahead of his time," Loeb says), also dealt with the ability to communicate with an especially advanced civilization, which cryptically exposes itself to humanity. The story deals with



Steven Spielberg and E.T. Research on communication or contact with extraterrestrial civilizations has focused mainly on the search for radio signals. Credit: Sunset Boulevard / Corbis via Ge

questions of faith, of the substance of communication and intelligent contact, and the ability of humanity to see beyond what may threaten it, or alternately, prove useful to it.

“We are born into a world like actors who were put on a stage and don’t know the content of the play we’re acting in,” Loeb says.

“Research of the universe indicates that the stage is very large. It’s 10 to the power of 26 times larger than our body. It’s something enormous, the universe. We are not at center stage, as Aristotle had thought. We have a natural tendency to think that everything revolves around us, but we’re not the main players. One of the ways to learn what the play is about could be to search for other actors. Perhaps they know, or perhaps they have better ideas,” he adds.

Scientific research is based on observations, experiments and events that can be replicated. But without horizons and curiosity, without serious thought about the very nature of the human race, about the very meaning of intelligence and consciousness, about the very essence of communication, and without the ability to imagine all these phenomena in a nonhuman context – the scientific establishment could ossify. It is possible that the maturation of the human race to “adulthood” actually means the ability to combine an empirical scientific approach with great philosophical and imaginative abilities, as well as the ability to cling to the pure spirit of science in search of truth, without regard for prejudice, interests and fear of making mistakes.

The great science-fiction writers understood this, and it seems as if history’s greatest scientists – Newton, Albert Einstein and their successors – thought exactly that. Without these abilities, the scientific community could become a fixed dogmatic institution like the Catholic Church in its time, the same church on whose altar no few scientists sacrificed their lives.

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