

Team of astronomers including Harvard researchers say they have found most distant galaxy on record, 13.5 billion light years away

By [Travis Andersen](#) Globe Staff, Updated April 7, 2022, 12:55 p.m.

A group of astronomers including researchers from the Center for Astrophysics of Harvard and the Smithsonian has discovered what could be the most distant galaxy on record from our little corner of the cosmos called Earth, according to Harvard University.

The tantalizing discovery was announced in [a statement](#) posted Thursday to the Harvard Gazette, an official university publication.

The statement said HD1 is roughly 13.5 billion light years away, per findings described Thursday in [the Astrophysical Journal](#). And scientists, in an accompanying paper in the Monthly Notices of the Royal Astronomical Society Letters, have posited two theories about HD1, the statement said.

One theory holds HD1 may be forming stars at an “astounding” rate and could host Population III stars, the universe’s very first stars that, until now, have never been observed, the statement said. The other theory suggests HD1 may contain a supermassive black hole about 100 million times the size of Earth’s sun, the statement said.

“Answering questions about the nature of a source so far away can be challenging,” said Center for Astrophysics astronomer Fabio Pacucci, lead author of the Royal Astronomical Society study and co-author of the Astrophysical Journal paper, in the statement. “It’s like guessing the nationality of a ship from the flag it flies, while being faraway ashore,

with the vessel in the middle of a gale and dense fog. One can maybe see some colors and

shapes of the flag, but not in their entirety. It's ultimately a long game of analysis and exclusion of implausible scenarios."

Pacucci said the fact that HD1 is extremely bright in ultraviolet light suggests "some energetic processes are occurring there or, better yet, did occur some billions of years ago," per the statement.

The statement said HD1 was spotted after more than 1,200 hours of "observing time" through the Subaru Telescope, VISTA Telescope, UK Infrared Telescope, and Spitzer Space Telescope.

"It was very hard work to find HD1 out of more than 700,000 objects," said Yuichi Harikane, a University of Tokyo astronomer who discovered the galaxy, in the statement. "HD1's red color matched the expected characteristics of a galaxy 13.5 billion light-years away surprisingly well, giving me a little bit of goosebumps when I found it."

The statement said the research team will use the James Webb Space Telescope to again observe HD1 to verify its distance from Earth. If current calculations are confirmed, the statement continued, HD1 will be the most distant — and oldest — galaxy ever recorded by scientists.

"HD1 would represent a giant baby in the delivery room of the early universe," said Center for Astrophysics astronomer [Avi Loeb](#), a co-author on the Royal Astronomical Society study, in the statement. "It breaks the highest quasar redshift on record by almost a factor of two, a remarkable feat."

Last week, the New York Times reported that a group using the Hubble Space Telescope announced they had discovered what could be [the most distant and earliest star ever seen](#), nicknamed Earendel, which twinkled 12.9 billion years ago, only 900 million years after the Big Bang.

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