

Mysterious signals from 1000 light years away

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In February 2003, astronomers involved in the search for extraterrestrial intelligence (SETI) pointed the massive radio telescope in Arecibo, Puerto Rico, at around 200 sections of the sky.

The same telescope had previously detected unexplained radio signals at least twice from each of these regions, and the astronomers were trying to reconfirm the findings. The team has now finished analysing the data, and all the signals seem to have disappeared. Except one, which has got stronger.

This radio signal, now seen on three separate occasions, is an enigma. It could be generated by a previously unknown astronomical phenomenon. Or it could be something much more mundane, maybe an artefact of the telescope itself.

But it also happens to be the best candidate yet for a contact by intelligent aliens in the nearly six-year history of the SETI@home project, which uses programs running as screensavers on millions of personal computers worldwide to sift through signals picked up by the Arecibo telescope.

Absorb and emit

"It's the most interesting signal from SETI@home," says Dan Werthimer, a radio astronomer at the University of California, Berkeley (UCB) and the chief scientist for SETI@home. "We're not jumping up and down, but we are continuing to observe it."

Named SHGb02+14a, the signal has a frequency of about 1420 megahertz. This happens to be one of the main frequencies at which hydrogen, the most common element in the universe, readily absorbs and emits energy.

Some astronomers have argued that extraterrestrials trying to advertise their presence would be likely to transmit at this frequency, and SETI researchers conventionally scan this part of the radio spectrum.

SHGb02+14a seems to be coming from a point between the constellations Pisces and Aries, where there is no obvious star or planetary system within 1000 light years. And the transmission is very weak.

"We are looking for something that screams out 'artificial,'" says UCB researcher Eric Korpela, who completed the analysis of the signal in April. "This just doesn't do that, but it could be because it is distant."

Unknown signature

The telescope has only observed the signal for about a minute in total, which is not long enough for astronomers to analyse it thoroughly. But, Korpela thinks it unlikely SHGb02+14a is the result of any obvious radio interference or noise, and it does not bear the signature of any known astronomical object.

That does not mean that only aliens could have produced it. "It may be a natural phenomenon of a previously undreamed-of kind like I stumbled over," says Jocelyn Bell Burnell of the University of Bath, UK.

It was Bell Burnell who in 1967 noticed a pulsed radio signal which the research team at the time thought was from extraterrestrials but which turned out to be the first ever sighting of a pulsar.

There are other oddities. For instance, the signal's frequency is drifting by between eight to 37 hertz per second. "The signal is moving rapidly in frequency and you would expect that to happen if you are looking at a transmitter on a planet

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that's rotating very rapidly and where the civilisation is not correcting the transmission for the motion of the planet," Korpela says.

This does not, however, convince Paul Horowitz, a Harvard University astronomer who looks for alien signals using optical telescopes. He points out that the SETI@home software corrects for any drift in frequency.

Fishy and puzzling

The fact that the signal continues to drift after this correction is "fishy", he says. "If [the aliens] are so smart, they'll adjust their signal for their planet's motion."

The relatively rapid drift of the signal is also puzzling for other reasons. A planet would have to be rotating nearly 40 times faster than Earth to have produced the observed drift; a transmitter on Earth would produce a signal with a drift of about 1.5 hertz per second.

What is more, if telescopes are observing a signal that is drifting in frequency, then each time they look for it they should most likely encounter it at a slightly different frequency. But in the case of SHGb02+14a, every observation has first been made at 1420 megahertz, before it starts drifting. "It just boggles my mind," Korpela says.

The signal could be an artefact that, for some reason, always appears to be coming from the same point in the sky. The Arecibo telescope has a fixed dish reflector and scans the skies by changing the position of its receiver relative to the dish.

When the receiver reaches a certain position, it might just be able to reflect waves from the ground onto the dish and then back to itself, making it seem as if the signal was coming from space.

"Perhaps there is an object on the ground near the telescope emitting at about this frequency," Korpela says. This could be confirmed by using a different telescope to listen for SHGb02+14a.

Possible fraud

There is also the possibility of fraud by someone hacking the SETI@home software to make it return evidence for an extraterrestrial transmission. However, SHGb02+14a was seen on two different occasions by different SETI@home users, and those calculations were confirmed by others.

Then the signal was seen a third time by the SETI@home researchers. The unusual characteristics of the signal also make it unlikely that someone is playing a prank, Korpela says. "As I can't think of any way to make a signal like this, I can't think of any way to fake it."

David Anderson, director of SETI@home, remains sceptical but curious about the signal. "It's unlikely to be real but we will definitely be re-observing it." Bell Burnell agrees that it is worth persisting with. "If they can see it four, five or six times it really begins to get exciting," she says.

It is already exciting for IT engineers Oliver Voelker of Logpoint in Nuremberg, Germany and Nate Collins of Farin and Associates in Madison, Wisconsin, who found the signal.

Collins wonders how his bosses will react to company computers finding aliens. "I might have to explain a little further about just how much I was using [the computers]," he says.

Eugenie Samuel Reich

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