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Astronomer uses Kepler telescope's data in hunt for spacecraft from other worlds

Geoff Marcy hopes instruments at the Keck Observatory in Hawaii will spot an errant laser beam flashing from a distant star system. (/FROM UNIVERSITY OF CALIFORNIA AT BERKELEY)

By Peter Brannen, Published: July 22

In the field of planet hunting, Geoff Marcy is a star. After all, the astronomer at the University of California at Berkeley found nearly three-quarters of the first 100 planets discovered outside our solar system. But with the hobbled planet-hunting Kepler telescope having just about reached the end of its useful life and reams of data from the mission still left uninvestigated, Marcy began looking in June for more than just new planets. He's sifting through the data to find alien spacecraft passing in front of distant stars.

He's not kidding — and now he has the funding to do it.

Last fall, the Templeton Foundation, a philanthropic organization dedicated to investigating what it calls the "big questions" — which, unsurprisingly, include "Are we alone?" — awarded Marcy $200,000 to pursue his search for alien civilizations.

As far as Marcy, an official NASA researcher for the Kepler mission, is concerned, that question has a clear answer: "The universe is simply too large for there not to be another intelligent civilization out there. Really, the proper question is: 'How far away is our nearest intelligent neighbor?' They could be 10 light-years, 100 light-years, a million light-years or more. We have no idea."

To answer that question Marcy has begun to sift through the Kepler data and to search the heavens for a galactic laser Internet that might be in use somewhere out there. (More on that in a bit.)

Launched in 2009, Kepler was designed as a four-year mission to detect planets — habitable or otherwise — around distant stars by measuring the dimming of those stars as orbiting bodies pass in front of them. In May, a component of the spacecraft designed to keep it pointing precisely failed, dealing a crushing blow to Marcy and his colleagues who last year convinced NASA to extend funding for the mission into 2016, which Marcy says would have allowed researchers to further refine the number of known Earthlike planets in our galactic neighborhood.

"It's a heartbreaker," he says. "People are reacting a little bit as if a close family member died. There's this combination of severe depression and confusion, coupled with denial."

100 billion exoplanets?

Kepler has been wildly successful in its four years. To date, it has found 132 exoplanets — that is, planets outside our solar system — and possibly 3,216 more that await confirmation. Researchers have extrapolated from Kepler data that our Milky Way galaxy alone contains at least 100 billion exoplanets, as many planets as there are stars. Still, with the telescope — which is 40 million miles from Earth — having collected data on 150,000 star systems, researchers are only beginning to pick through all the information.

Marcy hopes that hiding within it will be hints about intelligent life abroad. What if, say, the dimming of a star that Kepler observes is caused by something even more fanciful than the passage of extrasolar planets? Something synthetic, perhaps? Marcy admits that even he's not certain what he's looking for.

"I do know that if I saw a star that winked out, then at some point it winked back on again, then winked out for a long, long time and then blinked on again, that that would be so weird," he says. "Obviously that wouldn't constitute the detection of an advanced civilization yet, but it would at least alert us that follow-up observations are warranted."

Such an irregular pattern might signal the leisurely and unpredictable passage of massive spacecraft in front of the star. But, perhaps more likely, it might indicate the presence of a Dyson sphere, a mainstay of science fiction first proposed by physicist Freeman Dyson in 1960.

The concept is simple. The energy needs of a civilization a thousand or a million years more advanced than our own would probably be vastly greater than those of even the most profligate earthlings. The greatest source of energy in a solar system is its star, and that energy could be captured by building a massive structure tiled with solar panels enveloping the star — the ultimate green jobs initiative.

Under the second law of thermodynamics, the structure would produce incredible amounts of waste heat in the form of infrared radiation. In September, a Penn State team led by astrophysics professor Jason Wright began searching the sky for just that by combing through data from NASA's Wide-field Infrared Survey Explorer, or WISE. The Penn State work is also being funded by Templeton.

If Dyson spheres pop up in the data, Marcy thinks they would more likely appear as a patchwork of solar panels rather than a solid sphere. Perhaps the dimming of a star would be erratic or quasi-periodic, unlike the regular transit of planets.

To detect such aberrant dimming patterns, Marcy's Templeton grant is funding the salary of a Berkeley student to write software that will chew through the Kepler data."Writing the computer code is not easy," Marcy says. "There's no prescription in any computer science book about how to search for aliens."

Beyond radio waves

The rest of the $200,000 grant is buying Marcy time on the Keck Observatory in Hawaii, the largest telescope in the world, to search for — what else? — a galactic laser Internet.

While the movie "Contact," based on Carl Sagan's book of the same name, popularized the idea of aliens

dozens of light-years away picking up an old telecast of the 1936 Berlin Olympics that was unintentionally transmitted into space, our civilization has become quieter to any outside observers in recent decades. As our civilization makes the jump from analog to digital, communication is increasingly carried by fiber-optic cables and relatively weak cellphone repeaters rather than powerful broadcast transmitters. Rather than spilling out messy radio transmissions, Marcy posits that alien civilizations would use something much more precise and efficient than radio waves to stay connected, and lasers fit the bill. At the Keck Observatory, he hopes to spy an errant beam flashing from a distant star system, an observation that would be strikingly obvious on a spectrum.

This shift to new ways for finding E.T. is in part due to the failure of traditional SETI (Search for Extraterrestrial Intelligence) to pick up radio signals from deep space. Federal funding for SETI projects ended in 1995, but private benefactors have stepped up to support the search for alien radio transmissions, including Microsoft co-founder Paul Allen, who has sunk more than $30 million into a giant radio telescope array now under construction northeast of San Francisco.

Nevertheless, the silence underscores the question once posed by Nobel prize-winning physicist Enrico Fermi: If intelligent life is common in the galaxy, "where is everybody?"

Marcy admits that this so-called "Fermi paradox" poses a powerful counterargument to the prospect of success for any search for extraterrestrial intelligence. But what if, even if the chances are vanishingly remote, he is successful? More disturbingly, what if (as some respected physicists fear) he finds a Death Star?

"The first thing we do is transmit a message to them that says, 'We taste bad.'"

Brannen is a freelance science writer.