Earth-like Planets May Be Ready for Their Close-Up

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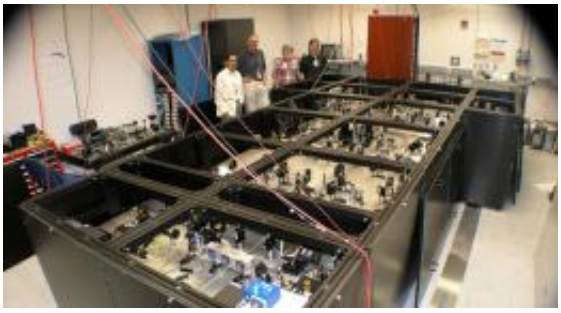

From left to right: JPLers Felipe Santos Fregoso, Piotr Szwaykowski, Kurt Liewer and Stefan Martin with the nulling interferometer testbed at JPL, where the device is built and refined. Image credit: NASA/JPL-Caltech

(PhysOrg.com) -- Many scientists speculate that our galaxy could be full of places like Pandora from the movie "Avatar" -- Earth-like worlds in solar systems besides our own.

That doesn't mean such worlds have been easy to find, however. Of the 400-plus planets so far discovered, none could support life as we know it on Earth.

"The problem with finding Earth-like planets," said Stefan Martin, an engineer at NASA's Jet Propulsion Laboratory, Pasadena, Calif., "is that their host stars can emit 10 million times more infrared light than the planet itself. And because planets like ours are small and orbit very close

to their respective stars, it makes Earths almost impossible to see."

Together with A.J. Booth (formerly at JPL and now at Sigma Space Corp., Lanham, Md.), Martin may have developed a way to make this almost impossible feat a reality.

Their instrument design, called a "nulling interferometer," observes planets in infrared light, where they are easier to detect. It is designed to combine starlight captured by four different telescopes, arranging the light waves from the star in such a way that they cancel each other out. "We're able to make the star look dimmer -- basically turning it off," Martin said.

Nulling interferometry is not a new idea, but what sets the results from Martin and Booth apart is how effective it turned out to be. "Our null depth is 10 to 100 times better than previously achieved by other systems," Martin said. "This is the first time someone has cross-combined four telescopes, set up in pairs, and achieved such deep nulls. It's extreme starlight suppression."

That suppression could allow scientists to get a better look at exoplanets than ever before. "We're able to make the planet flash on and off so that we can detect it," Martin said. "And because this system makes the light from the star appear 100 million times fainter, we would be able to see the planet we're looking for quite clearly."

Pandora, up close and personal

Nulling interferometry isn't the only way scientists can find other Earths. NASA's Kepler mission, currently in orbit, is looking for Earth-like planets by watching the light of faraway stars dim slightly as their planets pass in front of them. Another method of observing exoplanets is coronagraphy, which uses a mask to block the optical light of a star,

making its surrounding planets more easily visible. And the proposed SIM Lite mission would also be able to find nearby planets by observing the gravity-induced "wobbling" of their host stars.

However, Martin and Booth's nulling interferometer could eventually give astronomers the ability to get up close and personal with Earth-like worlds, analyzing their atmospheres for signs of habitability or even possibly life. "We expect to eventually be able to see hundreds of planets with this technique," Martin said.

The technology that they've developed could be used on a follow-up space mission to SIM Lite and Kepler. Martin is now planning to test the system in conditions that better mimic a real-life mission.

Once considered the stuff of science fiction, it may not be long before Earth-like planets, or, in the case of Pandora, Earth-like moons of giant planets, are found to exist other places besides the silver screen.

Provided by JPL/NASA