First use of VLBI to focus on a single star system for signs of life comes up empty

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An antenna of the Goldstone Deep Space Communications Complex. Among other tasks, it has been used for VLBI. Image: NASA

(Phys.org) -- Astronomers in Australia have reported on their findings in their paper posted on the preprint server *arXiv*, regarding their use of Very Long Baseline Interferometry (VLBI) to study radio signals emitted from a single star system some 20 light years away. In their paper, soon to be published in the *Astronomical Journal*, the researchers say that the absence of signals from the studied star system was not unexpected as the odds of finding signals from intelligent beings when aiming at any given star system are not good when noting that there are billions to choose from. Despite this, they report feeling optimistic as the project proved that such technology could be used to rule out other star systems in the future.

Ruling out star systems is in some sense a matter of semantics, as the authors note. It could be that a planet inhabited by some form of life just isn't broadcasting radio waves, or maybe is broadcasting but not at the frequency the team is looking at. They point out that had intelligent life forms light years away been looking at our planet just seventy years ago, they would have come up empty as well.

The paper documents the attempt by the Australian team (which is affiliated with the Search for Extra-Terrestrial Intelligence (SETI) project) back in 2007 to search for signs of life in a new way. Prior to this project, astronomers used radio telescopes that simply swept the sky looking for interesting signals. In this new approach the team focused on one star system which is thought to have two planets of the kind that might hold some form of life, using VLBI, which is where several telescopes are strung together virtually to create one large system. Such systems are better able to discern the difference between signals from other sources (such as our own satellites) versus ones that come from the source that is being studied. In all, the team detected 222 signals, all of which turned out to be from places other than Gliese 581, the star under study. They're not disappointed however; they say their work proves very clearly that VLBI will make a fine tool for studying exoplanets that have been found in recent years by other teams using other technology, and because this search technique costs so little, they don't see why it can't be used to study every single possibility, until hopefully one day some team finds what the SETI group has been looking for all along. Definitive signs of intelligent extra-terrestrial life.

More information: The First Very Long Baseline Interferometric SETI Experiment, arXiv:1205.6466v1 [astro-ph.IM]

Abstract
The first Search for Extra-Terrestrial Intelligence (SETI) conducted with Very Long Baseline Interferometry (VLBI) is presented. By

consideration of the basic principles of interferometry, we show that VLBI is efficient at discriminating between SETI signals and human generated radio frequency interference (RFI). The target for this study was the star Gliese 581, thought to have two planets within its habitable zone. On 2007 June 19, Gliese 581 was observed for 8 hours at 1230-1544 with the Australian Long Baseline Array. The dataset was searched for signals appearing on all interferometer baselines above five times the noise limit. A total of 222 potential SETI signals were detected and by using automated data analysis techniques, were ruled out as originating from the Gliese 581 system. From our results we place an upper limit of 7 MW/Hz on the power output of any isotropic emitter located in the Gliese 581 system, within this frequency range. This study shows that VLBI is ideal for targeted SETI, including follow-up observations. The techniques presented are equally applicable to next-generation interferometers, such as the long baselines of the Square Kilometre Array (SKA).