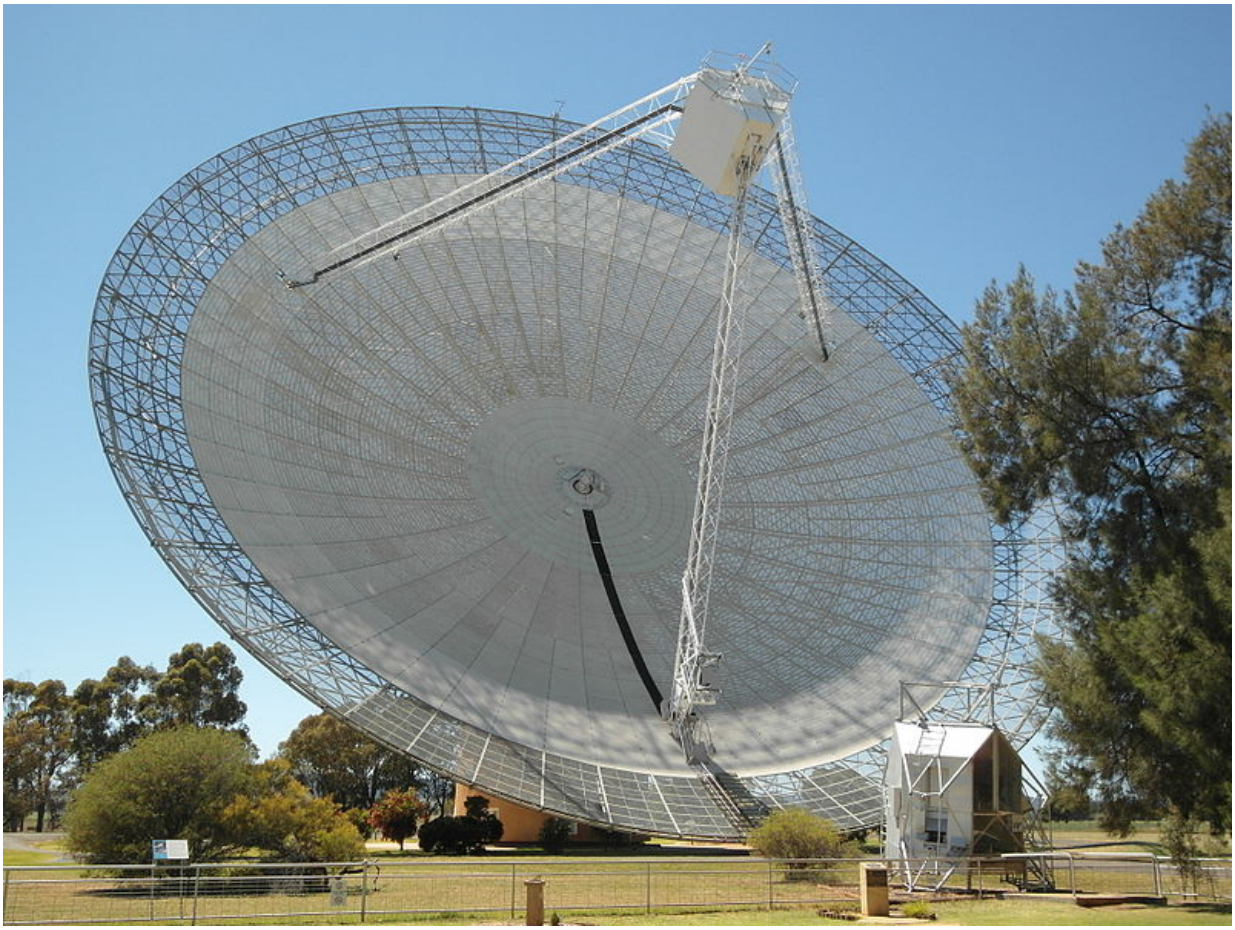
Giant radio telescope turns to new-found nearby planet

November 8 2016



Parkes Radio Telescope in New South Wales, Australia. Credit: Wikipedia

Breakthrough Listen, the 10-year, $100-million astronomical search for

intelligent life beyond Earth launched in 2015 by Internet entrepreneur Yuri Milner and Stephen Hawking, today announced its first observations using the Parkes Radio Telescope in New South Wales, Australia.

Parkes joins the Green Bank Telescope (GBT) in West Virginia, USA, and the Automated Planet Finder (APF) at Lick Observatory in California, USA, in their ongoing surveys to determine whether civilizations elsewhere have developed technologies similar to our own. Parkes radio telescope is part of the Australia Telescope National Facility, owned and managed by Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO).

Drawing on over nine months of experience in operation of the dedicated Breakthrough Listen instrument at GBT, a team of scientists and engineers from the University of California, Berkeley's SETI Research Center (BSRC) deployed similar hardware at Parkes, bringing Breakthrough Listen's unprecedented search tools to a wide range of sky inaccessible from the GBT. The Southern Hemisphere sky is rich with targets, including the center of our own Milky Way galaxy, large swaths of the galactic plane, and numerous other galaxies in the nearby Universe.

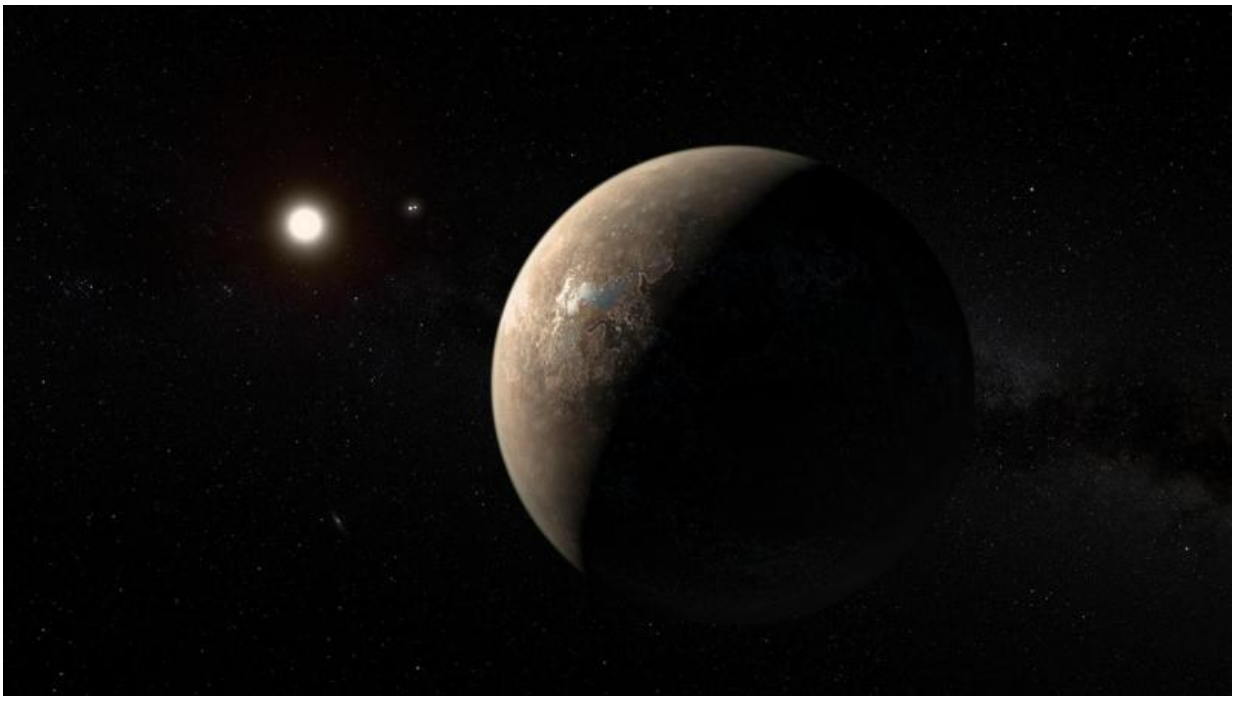
'The Dish' at Parkes played an iconic role in receiving the first deliberate transmissions from the surface of another world, as the astronauts of Apollo 11 set foot on our Moon. Now, Parkes joins once again in expanding human horizons as we search for the answer to one of our oldest questions: Are we alone?

"The Parkes Radio Telescope is a superb instrument, with a rich history," said Pete Worden, Chairman of Breakthrough Prize Foundation and Executive Director of the Breakthrough Initiatives. "We're very pleased to be collaborating with CSIRO to take Listen to the next level."

With its new combined all-sky range, superb telescope sensitivity and computing capacity, Breakthrough Listen is the most powerful, comprehensive, and intensive scientific search ever undertaken for signs of intelligent life beyond Earth.

Moreover, this expansion of Breakthrough Listen's range follows the announcement on October 12 that it will be joining forces with the new FAST telescope – the world's largest filled-aperture radio receiver – to coordinate their searches for artificial signals. The two programs will exchange observing plans, search methods and data, including the rapid sharing of promising new signals for additional observation and analysis. The partnership represents a major step toward establishing a fully connected, global search for intelligent life in the Universe.

"The addition of Parkes is an important milestone," said Yuri Milner, founder of the Breakthrough Initiatives, which include Breakthrough Listen. "These major instruments are the ears of planet Earth, and now they are listening for signs of other civilizations."



Artist's conception of Proxima Centauri b, with Proxima Centauri and the Alpha Centauri binary system in the background. Credit: ESO/M. Kornmesser

First light focused on exo-Earth

After 14 days of commissioning and test observations, first light for Breakthrough Listen at Parkes was achieved on November 7, with an observation of the newly-discovered Earth-size planet orbiting the nearest star to the Sun. Proxima Centauri, a red dwarf star 4.3 light years from Earth, is now known to have a planet ("Proxima b") within its habitable zone – the region where water could exist in liquid form on the planet's surface. Such "exo-Earths" (habitable zone exoplanets) are among the primary targets for Breakthrough Listen.

"The chances of any particular planet hosting intelligent life-forms are probably minuscule," said Andrew Siemion, director of UC Berkeley SETI Research Center. "But once we knew there was a planet right next door, we had to ask the question, and it was a fitting first observation for Parkes. To find a civilization just 4.2 light years away would change everything."

As the closest known exoplanet, Proxima b is also the current primary target for Breakthrough Listen's sister initiative, Breakthrough Starshot, which is developing the technology to send gram-scale spacecraft to the nearest stars.

"Parkes is one of the most highly cited radio telescopes in the world, with a long list of achievements to its credit, including the discovery of the first 'fast radio burst'. Parkes' unique view of the southern sky, and

cutting-edge instrumentation, means we have a great opportunity to contribute to the search for extra-terrestrial life," said Douglas Bock, Director of CSIRO Astronomy and Space Science.

Open data policy

As with the other Breakthrough Listen telescopes, data from Parkes will be freely available to the public online. Scientists, programmers, students, and others are invited to access the Breakthrough Listen archive for scientific research purposes, including helping perfect algorithms to sift through petabytes of raw data from the telescopes, screening for interfering signals from earth-bound technology. Volunteers can also help analyze data from Parkes by donating their spare computing power as part of BSRC's legendary SETI@home project.

Scope of Parkes observations

Breakthrough Listen at Parkes will be the most comprehensive search of the southern sky for artificial signals in six key samples:

- All 43 stars (at south declinations) within 5 parsecs, at 1-15 GHz. Sensitive to the levels of radio transmission at which signals 'leak' from Earth-based radar transmitters (with available receivers).
- 1000 stars (south) of all spectral-types (OBAFGKM) within 50 parsecs (1-4 GHz).
- One Million Nearby Stars (south). In 2016-2017, first 5,000 stars; 1 minute exposure (1-4 GHz).
- Galactic plane and Center (1-4 GHz).
- Centers of 100 nearby galaxies (south declinations): spirals, ellipticals, dwarfs, irregulars (1-4 GHz).
- Exotic sources will include white dwarfs, neutron stars, black

holes, and other anomalous natural sources (1-4 GHz).

Provided by Breakthrough Initiatives