UK launches Search for ExtraTerrestrial Intelligence Research Network

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The Lovell Telescope at Jodrell Bank inspired the first proposals to search for radio signals from extraterrestrial civilizations. Credit: Anthony Holloway, University of Manchester

(Phys.org) —A network has been launched to promote academic research in the UK relating to the Search for ExtraTerrestrial

Intelligence (SETI). The UK SETI Research Network (UKSRN) brings together academics from 11 institutions across the country. The network's Patron is the Astronomer Royal, Professor Martin Rees. UKSRN will present current activity and consider future strategy in a session and panel discussion at the National Astronomy Meeting in St Andrews on Friday 5 July.

UKSRN (www.seti.ac.uk) covers a broad spectrum of research topics, including potential methods for detecting signals, the linguistic challenge of deciphering messages, the probability of an extraterrestrial civilization interacting with Earth and the longevity of civilizations.

Dr Alan Penny, the coordinator of UKSRN said, "We hope that the existence of the network will excite interest from people in the UK astronomical community that have been thinking about SETI and encourage them to contribute their work. In this session at NAM, we are presenting the whole range of UK SETI activities to the community and hope that it will promote a wider understanding of, and activity in, this subject."

Dr Tim O'Brien from The University of Manchester's Jodrell Bank Observatory will describe the capability of the UK's recently commissioned e-MERLIN array of seven radio telescopes for SETI projects and report on progress in initial test observations.

The first proposal to search for radio signals from extraterrestrial civilisations was actually inspired by the construction of the Lovell Telescope at Jodrell Bank," said O'Brien. "We went on to take part in the SETI Institute's Project Phoenix from 1998 to 2003, searching for signals from about a thousand nearby stars. At that time the equipment required to sift through the data was expensive and unusual, but our modern telescopes are potentially capable of conducting these type of observations as a matter of course."

The e-MERLIN array, which includes the Lovell Telescope, is connected by optical fibres and spread over 217 km from Jodrell Bank to Cambridge. This multi-telescope approach offers potential for distinguishing true extraterrestrial signals from interference generated here on Earth, a key problem for all radio SETI projects.

O'Brien is excited about future prospects, "It's early days for this new SETI work at Jodrell but we think that using e-MERLIN, and future facilities such as the Square Kilometre Array, we could make an important contribution to the search for intelligent life elsewhere in the Universe."

Dr John Elliott of Leeds Metropolitan University is a researcher on the nature of communication: how language structure can be identified, and methods for subsequent decipherment and dissemination. He has analysed over 60 human languages, which cover all the different types of systems, as well as non-human communication, such as robots and dolphins. Elliot believes that by understanding our analytical capabilities for communication, we can develop strategies for extra-terrestrial message discovery and understanding.

"Suppose SETI succeeds and we detect a technological beacon. Any message is unlikely to be written in Martian English, so standard decipherment/decryption techniques used by the military and security agencies are not going to help much. To put the challenge into context, we still have scripts from antiquity that have remained undeciphered over hundreds of years, despite many serious attempts," said Elliott.

Elliott's research focuses on whether there is something unique to communication phenomena, irrespective of the source, that makes them distinguishable from other signals in the universe.

"By looking beneath the surface veneer of the arbitrary sounds and

symbols used, we can 'see' the language machine itself: its mechanisms, constraints, and evolutionary forces of efficiency and compromise that shape it. By understanding these structures, it should be possible to glean information on the intelligence of the message author," said Elliott.

Back in 1950 during a conversation on SETI, the physicist, Enrico Fermi, posed the question 'Where is everybody?' The paradox between the high estimates for the probability of the existence of extraterrestrial civilizations and the lack of contact or evidence remains a key area of SETI research. Dr Anders Sandberg, of the Future of Humanity Institute at Oxford University, is investigating the question of how far away in space and time a civilization could start and still have a chance of interacting with Earth today.

"If this were a very limited range, the Fermi question, "Where are they?" would be easy to answer: they couldn't have got here yet. However, we show in our paper that, beyond a certain technological level, civilizations can spread not just across their own galaxy but across enormous intergalactic distances. This is mostly limited by how fast their devices are and the expansion of the universe. There are millions or billions of galaxies from which a civilization could have reached us, if it were established early," said Sandberg.

Sandberg and his colleagues have concluded that the answer to the Fermi question is more extreme than normally thought. "If life or intelligence is rare, it must be millions or billions of times rarer; if advanced societies wipe themselves out, or decide to not go exploring, they need to converge to this outcome with extremely high probability, since it only takes one that escapes this fate to fill the universe," said Sandberg.

The work of Dr Austin Gerig, senior research fellow in Complex Networks at the University of Oxford, estimates the fraction of civilizations in the universe that are long-lived and analyses the human

race's prospects for survival.

Dr Gerig said, "We know that (1) we exist and that (2) our birth number within our civilization is approximately 70 billion (i.e., approximately 70 billion people were born before us). From such little information, we can reasonably, and perhaps surprisingly, conclude that (1) many other civilizations exist and that (2) most of these civilizations are small, i.e., most will die out before producing trillions of people."

Gerig and his colleagues have focused on a specific consequence of this reasoning, called the 'universal doomsday argument': long-lived civilizations must be rare because if they were not, we would find ourselves living in one.

"If most civilizations are small, then our own civilization is likely to be small, i.e., it is likely to die out within the next few centuries. Our research indicates this is the case, but that our estimates of survival are greater than previously thought using a more traditional form of the doomsday argument," said Gerig.

Duncan Forgan, from the Royal Observatory Edinburgh, is looking at the possibility of detecting large structures built by civilizations orbiting other stars. The transit method of detecting extrasolar planets involves measuring the dip in starlight as a planet passes in front of its star. The Kepler Space Telescope has detected a whole host of new exoplanets using the transit technique, and there are many future telescopes and missions lined up to succeed it. Forgan has investigated whether the obstruction of the stellar disc by a large orbiting structure would make a detectable difference in the shape of the lightcurve of an exoplanet transit.

"I looked at one type of megastructure, which is essentially a very large mirror. The mirror reflects the star's own radiation and produces thrust,

much like a sail produces thrust from wind. This thrust could be used to move a civilization's host star from its 'natural' orbit if it posed some harm to the civilization, for example a dangerous close approach to another star or dust cloud," said Forgan.

Forgan's study showed that a giant mirror of this type would leave a characteristic trace in exoplanet transit data, which could be detectable with the next generation of telescopes.

"While the odds of seeing megastructures are probably very low, we will soon have a huge archive of exoplanet data to search for these objects – at no extra cost to SETI scientists. We may detect the presence, or remains, of an alien civilization that felt the need to move their star!" said Forgan.

More information: www.seti.ac.uk/

Provided by Royal Astronomical Society

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