RadioNet FP7: Advanced Radio Astronomy in Europe

Radio astronomy can probe the distant universe, but it also has Earth-based applications, such as studying the movement of continents. Networking is a part of radio astronomy because a group of radio telescopes can see sharper than each of its members alone. RadioNet FP7, a continuation of the RadioNet project, will give European radio astronomers the infrastructure they need to work effectively with colleagues across the world. New digital electronics, fibre-optic communications links, human networks and better user support are some of the benefits.

WATCHING THE SKY WITH A HUNDRED EYES

In January 2005, a global network of radio telescopes in Australia, China, Japan and the USA tracked the European Space Agency's Huygens probe as it parachuted onto the surface of Titan, the largest moon of Saturn. Besides collecting the images and scientific data sent back by the probe, the radio telescopes were able to calculate the position of the landing site to an accuracy of around one kilometre. At a distance of 1 200 million kilometres from Earth, that is quite an achievement.

Radio telescopes, like their optical counterparts, gather radiation from distant objects. Instead of visible light, however, they cover the radio region of the electromagnetic spectrum, which characterises many astronomical objects, such as pulsars and quasars. Astronomers can learn much about the make-up of the universe by studying the frequency, power and timing of these radio signals.

A radio telescope uses a reflector shaped like a dish or trough to concentrate faint radio waves onto a receiver. The larger the dish, the more sensitive the telescope. Until recently the world's largest single steerable radio telescope was the 100m-diameter dish at Effelsberg, Germany. It is hard to make a steerable dish much larger than this, so to see more details of the radio sky individual dishes are linked to form an array that behaves like a 'super-telescope'.

Usually arrays consisting of radio telescopes are distributed over tens of kilometres and send their data to a central place where their signals are added to form such 'super-telescopes'. Very Long Baseline Interferometry (VLBI) uses simultaneous observations from radio telescopes hundreds or thousands

of kilometres apart to improve resolution still further and to detect smaller and smaller sources in the sky. This was the technique radio astronomers used to track Huygens with awesome precision.

With such benefits to be gained from collaboration, projects like RadioNet FP7 are the logical future for Europe's radio astronomers. RadioNet FP7 brings together all of Europe's leading radio astronomy facilities to improve the quality and quantity of European astronomical science. The Huygens observations were organised by a member of RadioNet FP7, the Joint Institute for VLBI in Europe (JIVE), based in the Netherlands.

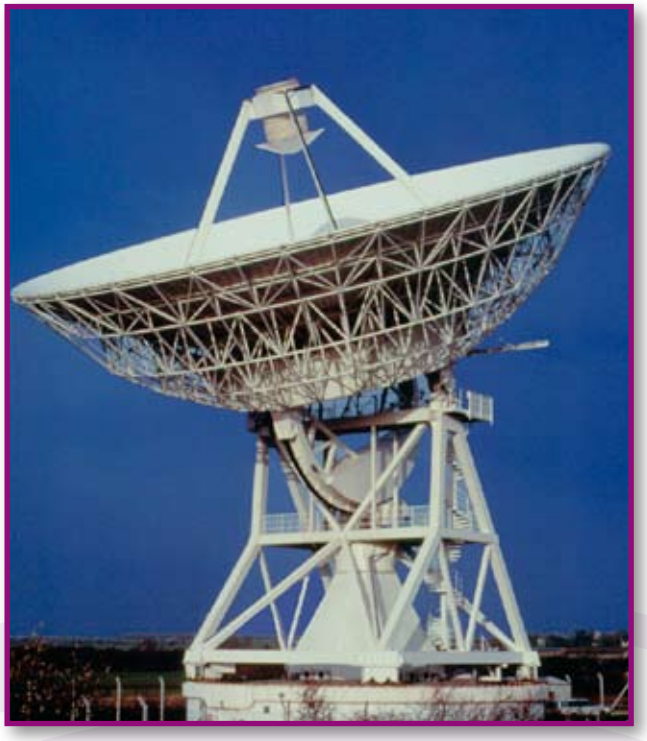
SEVENTH FRAMEWORK PROGRAMME

EUROPEAN COMMISSION

COLLABORATION FOR THE DIGITAL FUTURE

RadioNet FP7 has 26 participants, ranging from operators of radio telescopes to laboratories specialising in microelectronics, including monolithic microwave integrated circuits (MMICs) and superconducting components. The project has created a unique partnership that builds on and extends a series of existing, smaller collaborations and is expanding the network created under the first RadioNet project.

RadioNetFP7 is working to optimise the use and development of European radio astronomy infrastructure. By improving access to Europe's radio astronomical facilities, more researchers will be able to undertake studies they wish and add to Europe's growing knowledge in this field. Moreover, the project will ensure that technical developments in radio astronomy are supported Europe-wide through the pooling of skills, resources and expertise of European astronomers and researchers. Such collaboration will ensure broad-based, well-focused research that can be utilised across Europe.



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EU project officer: Elena Righi Steele

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Partners:
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Institut de Radioastronomie Millimetrique (FR)
Istituto Nazionale di Astrofisica (IT)
Joint Institute for VLBI Europe (NL)
Max-Planck-Gesellschaft zur Förderung der Wissenschaften (DE)
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