Big step forward for SKA radio telescope

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The discovery potential of the future international SKA radio telescope has been glimpsed following the commissioning of a working optical fibre link between CSIRO's Australian SKA Pathfinder (ASKAP) telescope in Western Australia, and other radio telescopes across Australia and New Zealand.

The achievement will be announced at the 2011 International SKA Forum, taking place this week in Banff, Canada.

On 29 June, six telescopes – ASKAP, three CSIRO telescopes in New South Wales, a University of Tasmania telescope and another operated by the Auckland University of Technology – were used together to observe a radio source that may be two black holes orbiting each other.

Data from all sites were streamed in real time to Curtin University in Perth (a node of the International Centre for Radio Astronomy Research) and there processed to make an image.

This ability to successfully link antennas (dishes) over large distances will be vital for the future $2.5 billion SKA telescope, which will have several thousand antennas, up to 5500 km apart, working together as a single telescope. Linking antennas in such a manner allows astronomers to see distant galaxies in more detail.

"We now have an SKA-scale network in Australia and New Zealand: a combination of CSIRO and NBN-supported fibre and the existing AARNET and KAREN research and education networks," said SKA

Director for Australasia Dr Brian Boyle.

The radio source the astronomers targeted was PKS 0637-752, a quasar that lies more than seven and a half billion light-years away from us.

This quasar emits a spectacular radio jet with regularly spaced bright spots in it, like a string of pearls. Some astronomers have suggested that this striking pattern is created by two black holes in orbit around each other, one black hole periodically triggering the other to "feed" and emit a burst of radiation.

"It's a fascinating object, and we were able to zoom right into its core, seeing details just a few millionths of a degree in scale, equivalent to looking at a 10-cent piece from a distance of 1000 km," said CSIRO astronomer Dr Tasso Tzioumis.

During the experiment Dr Tzioumis and fellow CSIRO astronomer Dr Chris Phillips controlled all the telescopes over the internet from Sydney.

Curtin University's Professor Steven Tingay and his research team built the system used to process the telescope data. "Handling the terabytes of data that will stream from ASKAP is within reach, and we are on the path to the SKA," he said.

"For an SKA built in Australia and New Zealand, this technology will help connect the SKA to major radio telescopes in China, Japan, India and Korea."

AARNet, which provides the data network for Australia's research institutions, has recently shown that it can implement data rates of up to 40 Gbps on existing fibre networks. That figure is for a single wavelength, and one fibre can support up to 80 wavelengths.

Provided by CSIRO