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SKA bid gains momentum with scientific 'breakthroughs'

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Africa's bid to build and host the Square Kilometre Array (SKA) telescope is gaining momentum with significant scientific breakthroughs, the Department of Science and Technology (DST) has said.

South Africa has, for the first time, completed the experiment on the "detection of fringes" in a joint long baseline interferometry (LBI) observation.

The 26 m dish at the Hartebeesthoek Radio Astronomy Observatory (HartRAO), near Pretoria, operated with one of the seven 12 m dishes currently part of the Karoo Array Telescope (KAT-7), over 900 km away, to jointly observe and record data from a distant radio source known as 3C273.

The data was then correlated in Cape Town to produce the first-ever African fringe detection at its first attempt.

South Africa SKA project director Dr **Bernie Fanaroff** said that the LBI was significant as it is used for imaging distant cosmic radio sources, spacecraft tracking, and for applications in astrometry.

"However, it can also be used in reverse to perform earth rotation studies, map movements of tectonic plates within millimetres, and other types of geodesy."

South African engineers have also put together the building block for the next generation of digital processing systems.

Fanaroff explained that the reconfigurable open-architecture computing hardware (ROACH) board was primarily a South African development and already in use in 300 high-technology facilities globally. However, ROACH-2 prototypes were much faster and more powerful.

"To put such computing speed and capacity in astronomy in perspective, the SKA is expected to collect more data in one week than humankind has col- lected in its entire history," he added.

The leap forward in technology largely resulted from advances in field-programmable gate array (FPGA) technology.

Fanaroff pointed out that this was all essential preparation for the SKA project.

"SKA will revolutionise science. It will be the world's largest radio telescope and probably capable of answering questions that we haven't even thought to ask yet," he noted.

Expected scientific discoveries range from understanding the cosmic web of neutral gas, which would unravel how the first stars and black holes were formed. It would track galaxies to investigate the rate of expansion of the universe and possibly identify the nature of dark energy.

It would also produce three-dimensional galactic maps and detect extremely weak extraterrestrial signals and pinpoint planets capable of supporting life.

Study of Gravity The SKA would allow for the study of gravity, which could possibly lead to the theory of relativity being challenged. Pulsars, the collapsed spinning cores of dead stars, would also be monitored, providing information on gravitational waves and black holes.

"In 2011, South Africa, in conjunction with its eight African-partner countries bidding communally for the SKA, will pull out all the stops to show the world that Africa is the future as far as science and technology are concerned."

South Africa and Australia are the two countries shortlisted to host the SKA – a deci- sion is expected next year. The SKA will be fully operational by 2024.

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