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Northern Cape bids for another giant telescope

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TWO hours' hard drive from the small Northern Cape town of Carnarvon lies Blauputs farm, its windswept acres of scrubby thorn bush and red earth home to little but owner Jan Louw's sheep, for even he does not live here.

There is no electricity, no cellphone reception, just a few winding hills. The deep quiet and isolation might not be to everyone's liking, but to astronomer Bernie Fanaroff it represents near perfection. For this might be the spot on which SA one day builds the world's biggest radio telescope, the Square Kilometre Array (SKA).

The telescope will search for very faint radio signals emitted by our early universe shortly after the big bang, information scientists hope will help prove Einstein's theory of general relativity and unravel one of the biggest mysteries of modern day astronomy — the nature of dark matter and dark energy.

"You solve these and you're guaranteed a Nobel prize," says Fanaroff, project manager for SA's bid to host the SKA.

SA is competing against Australia, China and Argentina to build the €1bn SKA which, like the Southern African Large Telescope (SALT) at Sutherland, is an ambitious international collaboration expected to generate spin-offs for the host country's industries and science communities.

SALT is the largest optical telescope south of the equator, and began taking its first pictures of the southern skies last year.

It has already increased tourism to the poverty-stricken region, excited a new generation of schoolchildren about science and, most importantly, demonstrated to the international astronomy community that SA is capable of pulling off big science projects, says Adi Paterson, the science and technology department's head of expert services.

SA's scientists are now lobbying the SKA's international steering committee to name the remote reaches of the Northern Cape as their preferred site for the giant telescope.

As cellphone towers, television transmitters and even the radar in overhead airplanes interfere with the signals sought by the massive radio telescope, it needs to be housed as far away as possible from the myriad sources of radio waves currently produced.

Although it is impossible to find a completely radio-quiet zone in SA, Louw's farm comes pretty close, says Fanaroff, noting that the surrounding hills act as a natural shield.

Louw himself still seems a little bemused by the sudden flurry of activity on his land. "I thought it was an April Fool's joke when the scientists phoned me two years ago," he laughs

Louw, who lives a few kilometres away from Blauputs, has been a supporter of the SKA bid ever since, despite having had no previous interest in astronomy. That has eased the way for the scientists, who lease a parcel of his land for their telescope work and rent rooms in his farmhouse.

International funders are expected to make their final decision on where to locate the SKA only in 2008. At this stage it is hard to tell how SA's bid compares with those of rivals as local scientists who have seen competitors' proposals are sworn to confidentiality and decline to discuss details.

Australia probably poses the stiffest competition, as it has an established astronomy community and a potential site in the remote reaches of its western desert, says Paterson.

But SA has advantages of its own: the dry climate of the northern Karoo is ideal for astronomy; it is in the same time zone as Europe; and it is rapidly grooming a new generation of astronomers, he says. However, regulatory uncertainties may count against its bid.

Government is still consulting industry about its proposals for controlling radio interference, contained in the draft Astronomy and Geophysical Advantage Protection Bill, and the Independent Communications Authority (Icasa) has yet to agree to constrain further proliferation of cellphone masts near the proposed site.

Scientists say they do not expect opposition from Icasa, but a deal has yet to be signed.

SA's proposed design for SKA consists of a core "radio fisheye lens" of flat tiles surrounded by an array of parabolic dishes spiralling out for thousands of kilometres into Namibia, Botswana, Mozambique, Ghana, Kenya, Madagascar and Mauritius. Its 4500 dishes will have a combined collecting area of 1km², making it 100 times more sensitive than existing radio telescopes. "SKA will take scientists further back than ever before, to between 200-million and 300-million years after the big bang" says Fanaroff.

As part of its bid, SA is also planning to build the Karoo Array Telescope (KAT), a smaller radio telescope that will road-test some of the technology intended for the giant SKA, and demonstrate local capabilities. The KAT will consist of 20 dishes each 15m across, spread over 1km.

Australia is also building its own scaled-down SKA, called the Extended New Technology Demonstrator.

Government has already committed almost R300m to the KAT, and has just awarded an R8m contract to local defence firm IST to build a prototype dish. Construction on both demonstrators is due to begin in 2009.

Even if SA fails to win the SKA bid, developing the KAT will give South African scientists and industry the technological know how to participate in the final

project, says Fanaroff.

SKA project scientist Justin Jonas says there is already international interest in the KAT, and it will be a world-class scientific instrument in its own right, capable of reaching 10 times further into the early universe than anything in the current telescope armoury.

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