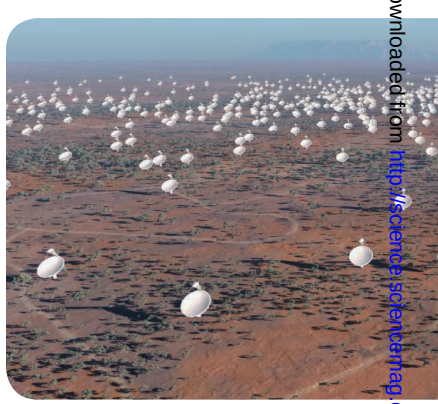
Roy Maartens is a professor in the Department of Physics at the University of the Western Cape, Cape Town, South Africa. E-mail: rmaartens@uwc.ac.za.

George Ellis is a professor in the Department of Mathematics and Applied Mathematics at the University of Cape Town, Cape Town, South Africa. E-mail: george.ellis@uct.ac.za.

A New Dawn for Science in Africa

TO REVOLUTIONIZE RADIO ASTRONOMY, THE INTERNATIONAL SQUARE KILOMETRE ARRAY (SKA) project (www.skatelescope.org) has a visionary plan for a $2 billion telescope network, and much of it will be based in Africa. For the first time, the continent will host the world's largest scientific instrument, symbolizing the importance of science and technology for Africa's future.

Radio waves emitted by objects in space provide alternative views of the universe to those seen with optical telescopes. Linked together, radio telescopes create an interferometer, and the SKA will be the world's largest such array. Five key science projects will address fundamental questions in physics, astrophysics, cosmology, and astrobiology, including the birth and evolution of galaxies, dark energy, the nature of gravity, and the search for life beyond Earth. As announced in late May 2012, Africa will host about 70% of the array, with the remainder in Australia and New Zealand. The core site in Africa will be in the semi-desert Karoo of South Africa, where part of SKA Phase I is already under construction (the MeerKAT array). This area already has advanced infrastructure and hosts the locally designed and manufactured KAT demonstrator radio array, as well as the international PAPER radio array and CBASS radio dish. Additional SKA telescopes will be built in South Africa's SKA partners Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia, and Zambia. In Ghana, an obsolete telecommunications dish is being converted into a radio telescope with South African and British assistance.



The success of South Africa's bid to act as the SKA core site is testimony to the nation's vision in recognizing the potential impact of a high-profile iconic project that is comparable in scope to the Large Hadron Collider in Europe. Hundreds of millions of dollars from the government and a strong astronomy and engineering capability have underpinned the bid. The efforts of South African Science Minister Naledi Pandor, the South African SKA project team, and local astronomers and engineers have paid off: Thousands of dishes and antennas, together with infrastructure and supercomputing facilities, will be built in African nations over the coming decades. Even modest SKA infrastructure will help to trigger interest in science among the youth and produce broader technological spinoffs. New astronomy courses have been launched at universities in South Africa's eight SKA partner countries. High-level skills training is based in South Africa, and its SKA Human Capital Development (HCD) program has funded over 70 African graduate students from outside South Africa.

DIMENSIONS OF SCIENCE COOPERATION

In South Africa, the legacy of apartheid education, reflected in poor science and maths outcomes at the school level, creates a serious challenge to the training of black scientists and engineers. But the South African HCD program is playing a major role in meeting this challenge. It has funded 50 postdoctoral researchers, 60 Ph.D. and 100 M.Sc. students, and more than 200 undergraduate and technical college students. Of the total of 425 funded since 2005, 60% are black and 29% are female. In parallel, the innovative inter-university National Astrophysics and Space Science Programme has produced 75 master's degrees, which have led to 21 Ph.D. degrees at both local and international institutions. Both efforts have already produced graduates who have won prestigious postdoctoral fellowships in Europe and the United States.

In addition to strengthening intracontinental science collaboration, the SKA project will bolster intercontinental cooperation between Africa and the other SKA partners: Australia, Canada, China, Italy, the Netherlands, New Zealand, Sweden, and the United Kingdom. If history is any guide, this magnificent new instrument will make many more discoveries than we can imagine today, while also helping to realize the potential of the large reservoir of scientific talent in Africa.

– Roy Maartens and George Ellis

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Online

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Podcast interview with author Roy Maartens (http://scim.ag/ed_6097).

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