

Things look up for Rhodes and partners with new telescope

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Rhodes University is joining other top international hi-tech institutions to get its own taste of a TART (Transient Array Radio Telescope), invaluable for both research and teaching.

According to its developers at the University of Otago in New Zealand, the TART is a 24-element synthesis array radio-telescope able to continuously observe the entire sky and detect transient events.

These include satellites, near-earth objects and high-energy cosmic rays.

The telescope is also designed to serve as a platform for the development of new imaging

algorithms, its developers say.

Rhodes science dean Tony Booth launched the university's TART at its Waainek site above Makhanda this week.

The project is a collaborative effort by Rhodes University, the University of Otago and Stellenbosch University.

The TART design is a low-cost and open-source 24-element initially developed by Dr Tim Molteno and his group at Otago to provide a test-bed for developing and testing state-of-the-art calibration and imaging algorithms for radio astronomy. This Rhodes-based TART initiative started with early brainstorming sessions in 2021 between Square Kilometre Array

(SKA) research chair Prof Oleg Smirnov, Rhodes University physics lecturer Dr Stanley Kuja, mathematics lecturer Dr Patrice Okouma, and Molteno.

"Dr Kuja, as project lead engineer, oversaw the installation and testing of the TART with two brilliant young graduates, Rikus Human from Stellenbosch University and Sonia Ghosh from the Raman Institute in India, currently an intern at Rhodes," the university said.

A particular innovation of the Rhodes group was the layout of this version of the TART, which consists of 24 movable antennas mounted along three beams that are arranged in the shape of a Y.



This layout echoes the iconic Very Large Array radio telescope in New Mexico in the US

The layout echoes the iconic Very Large Array radio telescope in New Mexico, US.

The university said the TART would provide an excellent platform for student training and research in machine learning, and electromagnetic compatibility (EMC) metrology.

As an additional benefit it will add to the university's extensive community engagement in the form of STEM (science, technology, engineering and maths) consolidation for Makhanda's school-goers.

The low-cost but powerful capabilities of the electrical components of the TART extend the opportunities for the "break and rebuild" electronics

approach for teaching and learning purposes, Kuja said.

"Since radio frequency interference (RFI) is a major concern in radio astronomy, intelligent techniques in characterising RFI at the Waainek site can be transferred to the SKA-MeerKAT project."

Smirnov described it as the perfect instrument for learning and experimentation.

"Our SA flagship, MeerKAT, can be a little intimidating for students — competition for time is stiff, data volumes are huge, and the instrument itself is at a remote Karoo site.

"The TART is right here, it is very hands-on, and data is freely available to all."