South African Radio Astronomy Observatory Activities and Overview

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Towards high-performance mm-VLBI science operations with multi-band receivers, Bologna, Italy, 2025

www.sarao.ac.za

The South African Radio Astronomy Observatory (SARAO) is a National Facility managed by the National Research Foundation and incorporates all national radio astronomy telescopes and programmes.

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- Introduction – The MeerKAT Telescope.
- Receiver Systems Team
- Ongoing Projects & Development Work

Introduction

SARAO and The MeerKAT Telescope

- The South African Radio Astronomy Observatory (SARAO) is a National Facility which incorporates all national radio astronomy telescopes and programmes.
- Originally known as the Karoo Array Telescope (KAT) consisting of 20 receptors. The telescope was renamed “MeerKAT” – i.e. “more of KAT” after the project expansion to 64 receptors was approved.
- The Meerkat, pictured to the right, is also a beloved small mammal residing in the Karoo region.
- The MeerKAT telescope is a precursor to the Square Kilometre Array (SKA) telescope and will be integrated into the mid-frequency component of SKA Phase 1.

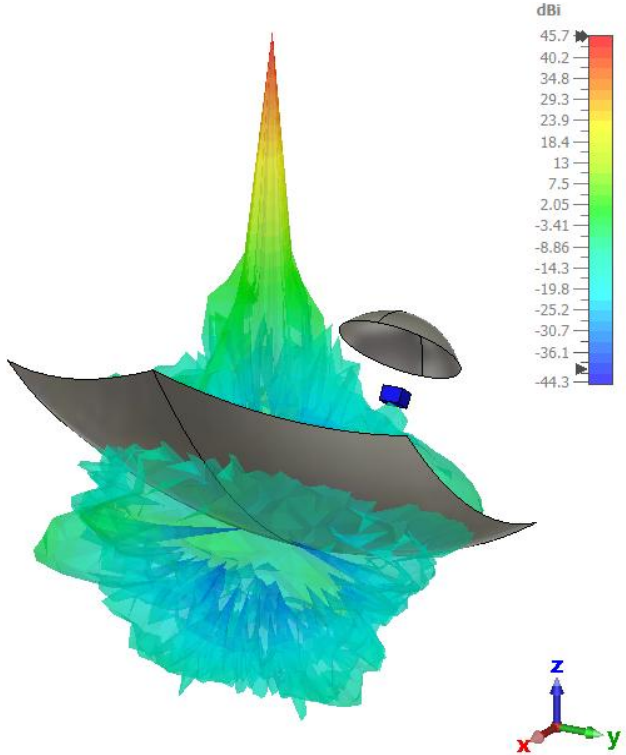
A gang of Meerkats with some pointing error.
Source: https://www.britannica.com/animal/meerkat

[1] SARAO Official Website: https://www.sarao.ac.za/about/

Receiver Systems Team

- The Receivers Team at SARAO is mainly responsible for,
  - Development of digitiser systems.
  - Radio frequency control units or RFCUs – signal conditioning and down conversion.
  - Repair and maintenance of receivers on-site.
  - EM analysis of reflectors – holography, photogrammetry etc.

MeerKAT Telescope photograph from the core.

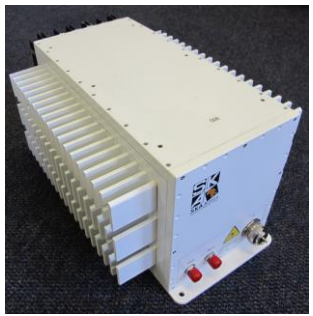


Farfield 3d pattern visualization in CST Studio [2].

[2] https://www.3ds.com/products/simulia/cst-studio-suite

Ongoing Development Work

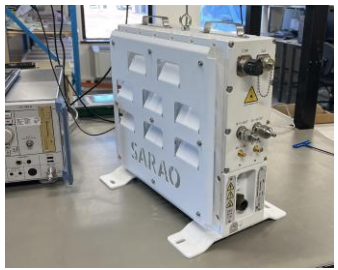
- Ongoing projects and development work:
  - MeerKAT+ project – dish and receiver.
  - Ku-band test receiver.
  - SPFRx45 receiver development.
  - HF-Receiver design for the Africa2Moon project.
  - Establishment of a cryogenics test facility.
  - Research multi-band VLBI receivers K,Q and W bands.
  - Africa Millimeter Telescope LF feasibility study.



MeerKAT Digitiser.

MeerKAT+ D-engine hardware.

Ku-band Test Receiver



Band 5b Receiver.

Thank you

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References

[1] SARAO Official Website: https://www.sarao.ac.za/about/
[2] Dassault Systemes, “CST Studio Suite 2025,” https://www.3ds.com/