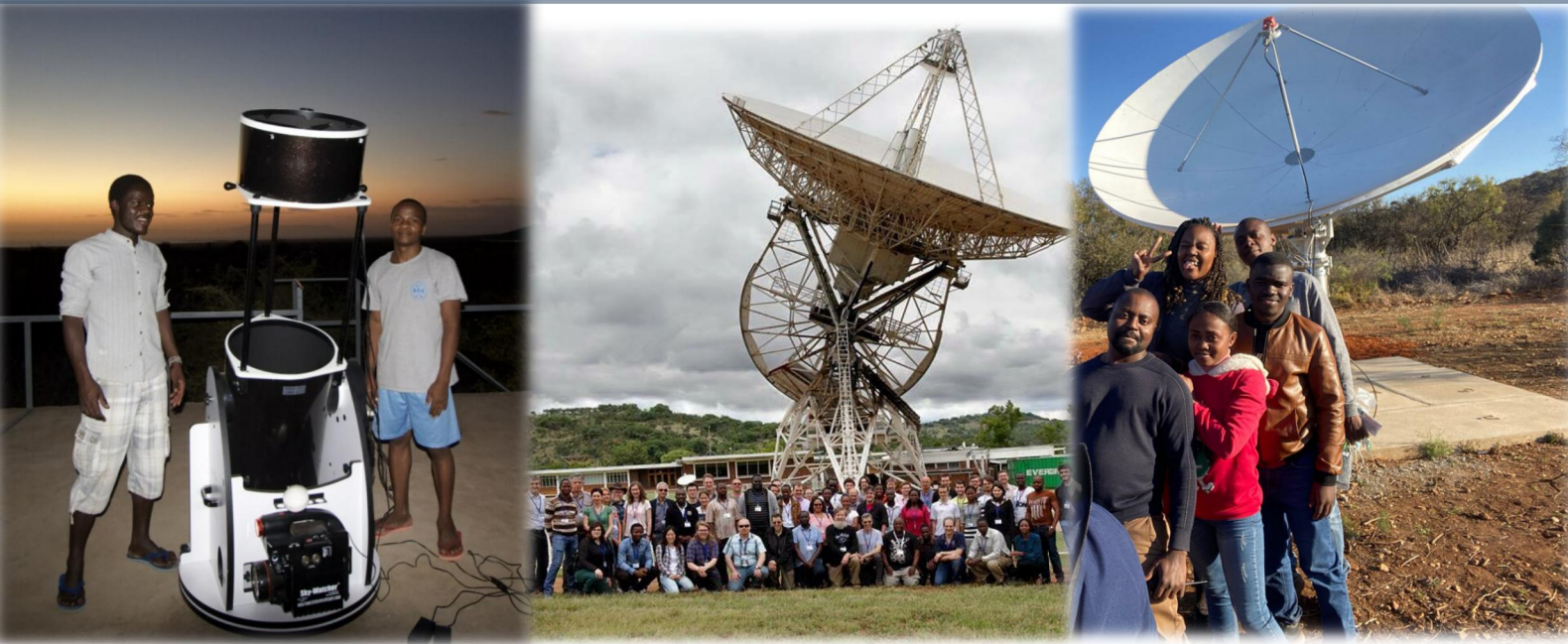
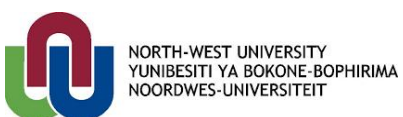


DARA-KOTI Astronomy Training Programme



THE UNIVERSITY
of EDINBURGH



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA



Introduction

Africa is becoming the focus for the world of astronomy. Construction is underway of the mid-frequency dishes of the Square Kilometre Array (SKA) – the next generation global radio astronomy facility that will be built initially in South Africa, and then rolled out across eight African partner countries, including Kenya. South Africa also hosts the South African Large Telescope (SALT), which with its 10 m diameter mirror is one of the largest optical telescopes in the world.

To support the development of astronomy in Africa and ensure that opportunities in this area are open to African citizens two projects funded primarily from the UK have been running over the past few years. The Development in Africa with Radio Astronomy project (DARA: www.dara-project.org) has run a basic training programme with the aim of offering any suitably qualified person the opportunity to become familiar with the basics of astrophysics and radio astronomy and gain hands-on experience. Similarly, the Kenyan Optical Telescope Initiative (KOTI – kotionline.org) has been leading efforts to bring optical telescopes to Kenya.

These two projects have now joined forces to offer a training programme in optical and radio astronomy for citizens of Kenya and South Africa. The training will take place in South Africa and Kenya delivered by experts from the UK, South Africa and Kenya. Hands-on training in optical astronomy will take place at the Turkana Basin Institute in northern Kenya. Practical training in radio astronomy will take place at the Hartebeesthoek Radio Astronomy Observatory and North West University in South Africa. Training in computer skills in Linux and python will also be provided. Advice on the industrial opportunities afforded by knowledge of skills in astronomy techniques will be provided by experienced entrepreneurs from our industrial partners in the commercial space sector. The basic training programme will consist of:

- 8 weeks of lectures, workshops and hands-on sessions spread out over a half year;
- on completion trainees will receive a certificate of completion and can request a reference letter from their trainers;
- trainees will then be in a position to apply for advanced training places in astronomy at Masters or PhD level, or use their new skills to aid the development of related high tech industries.

Eligibility

In Kenya the programme is open to any suitably qualified person from Kenya who wants to undertake the training or to be re-trained in astronomy. No prior experience of astrophysics is required. Applicants would normally be expected to be graduates in physics or a related subject. Students who are currently studying or employed need to obtain a letter of permission from their Head of Department or line manager stating that they will be giving the time off to attend all the basic training programme elements.

Training Package

The basic training programme is fully funded by the University of Leeds, therefore students will not have to pay a fee or any costs. The training package includes accommodation, meals and travel to the training venues in South Africa and Kenya. An out-of-pocket allowance will also be included.

How to Apply

Applicants should complete the application form and send it together with a CV, passport copy (if in possession) and transcripts to the following contact from the Technical University of Kenya:

Prof Paul Baki, E-mail: paulbaki@gmail.com

The application must also be copied by e-mail to m.g.hoare@leeds.ac.uk

Deadline for applications: 29th July 2023

Applications received after this date will not be considered.

The Training Programme

The training programme will consist of four or five 2-week elements spread over half a year.

Foundation Astrophysics Online Training

Prior to the commencement of the onsite training below trainees will be required to undertake online courses in astronomy and/or radio astronomy depending on their previous experience. Those with no prior experience of astrophysics should take the DARA Foundation Astrophysics course. This consists of 20 online lectures by Prof Melvin Hoare from the University of Leeds covering the basis of astrophysics as well as exercises to complete. Those with some prior experience of astrophysics should take the DARA Unit 1 Astrophysics online course, which also consists of 20 online lectures by experts focussing on radio astronomy as well as workshop exercises.



For those taking the Foundation course it would be advisable to complete the Unit 1 Astrophysics prior to the practical radio astronomy training as well. Each online course will take about two weeks to complete in your own time.

Practical Optical Astronomy Training

This will take place from 25 September to 6 October 2023 and will be delivered by trainers from the University of Edinburgh, University of Leeds and Technical University of Kenya. It will be hosted at the Turkana Basin Institute in northern Kenya.

- Introduction to observational astronomy – coordinate systems, planning an observation
- Introduction to optical astronomy – telescopes and detectors, photometry, spectroscopy, time domain
- Practical sessions using the 40 cm optical telescope
- Introduction to radio astronomy and practical sessions using a small radio telescope and RFI monitoring device
- Reduction and analysis of the data taken



Computer Training

This will take place from 29 January to 2nd February at HartRAO (location to be confirmed).

- This will introduce students to the Linux operating system and python scripting language that is widely used in astronomy as well as in industry and commerce. The course will be delivered by experts from the Centre for High Performance Computing in South Africa. It will take place at either Hartebeesthoek Radio Astronomy Observatory or Technical University of Kenya using the cluster of computers provided by the DARA project.



Practical Radio Astronomy Training

To take place from 5th to 16th February 2024 (to be confirmed). These units will be taught using a mixture of lectures, workshops and hands-on training. The first week will be at Hartebeesthoek Radio Astronomy Observatory and the second week at North West University in Potchefstroom, South Africa.

Technical Training

- Radio Telescopes - astronomical drive and tracking systems, Radio Frequency Interference and mitigation procedures.
- Receiver Systems - feedhorn, amplifiers, cryogenics, downconverter, local oscillator, digital backend
- VLBI Techniques - recording systems, e-VLBI, hydrogen masers and geodesy

Observational Training

- Practical sessions using the 4-element array of 3.7 m dishes
- Single dish observations
- Interferometric observations
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Annual Network Meeting

At the end of the training programme in February 2024, trainees will attend a 2-day annual network meeting in South Africa (exact date and location to be confirmed, but will follow on from practical training above). Representatives from the DARA industrial partners will provide training on opportunities in related areas such as space science, satellite communications, telecommunications and big data. There will also be a workshop on the use of astronomy for development from our partners at the IAU Office of Astronomy for Development. A CV workshop will allow you to discuss your potential future directions with the academics and industrial partners.