

RADIOASTRONOMY PROJECTS IN GHANA

Ghana Space Science and Technology Institute



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Director



RADIO ASTRONOMY PROJECTS: AVN GHANA

SKA SA Partner Countries



➤ The objective of the project is to build the needed capacity in the SKA Africa Partner Countries in terms of:

- ✓ *Human Capital development*
- ✓ *Infrastructure*
- ✓ *Improving sensitivity and Resolution*

➤ The conversion of the 32m diameter dish at Kuntunse for use as a radio telescope is the first infrastructure to roll

FABRICATION OF THE QUADRUPOLE LEGS FOR THE ANTENNA.



The damaged quadruple legs which holds the sub-reflector of the antenna was designed by SA and Ghana Team and fabricated at the GAFC Mechanical workshop.



The quadruple leg was installed. This was a huge milestone. This is because it had the potential of damaging the antenna beyond repairs. Weight of the quadruple Legs = 4000 kg; approximately = 4.0 tones

KUNTUNSE OBSERVATORY



SCIENCE WITH THE KUNTUNSE 32M ANTENNA

(A) Single-Dish Science Cases:

- *Radio Continuum Flux measurements (with wideband multi-channel radiometer) - use known radio astronomy calibration sources for daily calibrations of receivers and also follow radio emissions from sources such as AGNs emitting gamma-ray flares.*
- *Pulsar Observations (with wideband multi-channel pulsar timer) - monitor the behavior of pulsars of interest over a long period of time, such as those producing glitches and intermittent pulsars, and hunt for fast radio burst sources.*
- *Emission Lines Spectroscopy (with narrowband multi-channel spectrometer) - maser line monitoring of star forming regions, including hydroxyl masers (1612, 1665, 1667, 1720 MHz) and methanol masers (6668 MHz).*

(B) VLBI Networks Science Cases:

- *Mapping Interstellar masers in star-forming regions in the Milky Way.*
- *Determining the distances to star-forming regions in the Milky Way through methanol maser parallax measurement.*
- *Imaging active galactic nuclei (AGN).*
- *Resolving binary systems in extragalactic supermassive black holes.*
- *Imaging radio emission from X-Ray binary systems and relativistic jets.*

LEVERHULME-ROYAL SOCIETY AFRICA AWARD

- *Awarded to GSSTI on August 06, 2013*
- *Led by Prof. Melvin Hoare (Leeds) and Dr. Kofi Ashilevi (GSSTI)*
- *Duration: Three (3) Years*
- *Start: March 01, 2014*
- *End: February 28, 2017*



Award Title:

Radio astronomy capacity building in Ghana prior to the Square Kilometer Array

LEVERHULME-ROYAL SOCIETY AFRICA AWARD

The logo for The Royal Society, featuring the text "THE ROYAL SOCIETY" in white, serif, all-caps font on a solid red rectangular background.

THE
ROYAL
SOCIETY

Award to cover

- *Travel cost*
- *Research*
- *Training programmes*
- *Subsistence*
- *Equipment costs*
- *PhD studentship*

- *Grant total £179, 100
(for the 3 years)*
- *£59, 700 per annum*

ROYAL SOCIETY TRAINING AND OUTREACH PROGRAM



ROYAL SOCIETY AWARD: TRAINING PROGRAM



Participants

- Cohorts 1 - 12
 - Cohorts 2 - 13
- During 2014 - 2017



ASTRONOMY PROJECTS: OUTREACH & TRAINING



SKA-SA, ROYAL SOCIETY AND NEWTON FUND AWARDS PHD & MSC STUDENTSHIP



Kuntunse Telescope Trainee Operators

- *Andrews*
- *Benedicta*
- *Kingsley*

Theophilus Narh-PhD in SA

Alexander - PhD in SA

Proven - PhD in Ghana

Benedicta- PhD in Ghana

Naomi - PhD in UK

Diana- MSc in SA

Mavis - MSc in SA

Prosper - MSc in Brazil

Emmanuel - MSc (DARA) in UK

Joseph- MSc in UK

ROYAL SOCIETY TRAINING OUTLINE

Course Units for the Cohorts:

1. *Astrophysics, Radio astronomy theory and multi-wavelength astronomy*
2. *Data Reduction and Analysis, Telescope time and PhD applications*
3. *Satellite communication and Commercial awareness*
4. *Technical training*
5. *Observational training (up coming for both groups)*

Units Instructors for both Cohorts

1. *Prof. Melvin Hoare (UK)*
2. *Dr. Sharmila Goedhart (SA)*
3. *Dr. Charles Copley (SA)*
4. *Mr. Ian Jones (UK)*
5. *Dr. Katerine Johnson (UK)*

UPCOMING NEWTON FUND TRAINING AND ROYAL SOCIETY EVENTS

A. Observational Training Program from 19 April - 5 May, 2017:

comprising

15 students from 1st and 2nd Cohorts (Ghanaians) and 10 students from Kenya

B. Pulsar timing system training in May 2017



C. Unit 1 Training for 3rd Cohort 3 student from May 5 - 19, 2017:

Expecting 10 - 12 students from Ghana



Upcoming Event: WEST AFRICAN SUMMER SCHOOL FOR YOUNG ASTRONOMERS

- The program is from 23rd July to 6th August and we are anticipating 50 students from West Africa
- The instructors are 6 from West Africa and 5 from Canada and Europe
- Sponsors so far are:



CONCLUSION

Many Thanks To:



And Much Appreciation To:

Prof. Melvin G. Hoare





THANK YOU ALL FOR YOUR ATTENTION

