

Topic: Radio Astronomy (5 lectures)

Lecturer: Dr James Chibueze

Description: An introduction to the fundamentals of radio astronomy and radio interferometry. The emission processes, their detection techniques as well as hands-on 'lecture' on radio astronomical data handling will be covered.

Syllabus:

Lecture 1: Radio waves and emission and their properties

- Continuum emission
- Spectral line emission
- Properties of radio signal

Lecture 2: Radio telescopes

- Antenna beams
- Feed Systems
- Antenna efficiency
- Operation principle of radio telescopes

Lecture 3: Single-dish radio telescope

- Sample science cases and techniques
- Pointing, bandpass, point source sensitivity
- Sample data processing

Lecture 4: Fundamental of radio interferometry

- Aperture synthesis
- Very long baseline interferometry

Lecture 5: Radio interferometric data processing

Requirements: Video projector in the class room, UNIX OS pcs (laptops) with python and CASA 5.6.2 installed.

Bibliography

* Burke, Graham-Smith, Wilkinson, An Introduction to Radio Astronomy (4th ed)

* Thompson, Moran, Swenson Jr, Interferometry and Synthesis in Radio Astronomy (3rd ed)