Course code	20DASb0701
Course title	Radio Astronomy Ⅳ
Term	後期 2nd Half
Credit(s)	2
The main day	
The main period	
School/Program	School of Physical Sciences
Department/Program	Department of Astronomical Science
Category	Radio Astronomy
Lecturers	Masumi Shimojo

Instructor

Full name
SHIMOJO　MASUMI

Outline

The Sun is the nearest star to us and one of the targets since the early ages of radio astronomy. Solar radio observations provide us the knowledge to understand not only solar activities but also disturbances in the heliosphere. In the lecture, at first, we briefly recapitulate plasma physics for understanding the emission mechanism of solar radio. Then, students will learn the emission mechanism of solar radio and the solar phenomena investigated with solar radio. Additionally, students will carry out the calibration of actual solar radio data to gain a basic idea of radio observations. Note: Atomic and molecular lines in radio range are one of the main targets of radio astronomy, but we do not touch on the topics in this lecture because we focus on solar radio issues.

Goal

The main objective for students is to understand the radio emission from the Sun and stars, and to be able to deduce the physical process of the solar/stellar phenomena from radio data.

Grading system

01:Four-grade evaluation (A,B,C,D)

Grading policy

Assessment will be done based on exercise works with observational data (40%) and final report (60%) for students with the attendance more than 60%.

Lecture Plan

1. Introduction of Solar Radio Physics
2. Recap of Plasma Physics: 1
3. Recap of Plasma Physics: 2
4. Brightness and Flux Density, Radiative Transfer
5. Thermal radiation 1 (Free - Free)
6. Thermal radiation 2 (Gyro-resonance)
7. Non-Thermal radiation (Synchrotoron/Gyro-synchrotron)
8. Non-Thermal radiation (plasma emission)
9. (Solar) Radio Telescopes
10. Exercise: working with observational data
11. Exercise: working with observational data
12. Solar Atmosphere and Heliosphere
13. Solar Radio Bursts related with Solar Flares and CMEs
14. Particle Acceleration in Solar Atmosphere
15. Toward to Stellar Radio Astronomy from Solar Radio Physics

Location

Mitaka campus in National Astronomical Observatory of Japan, or OnLine

Language

Japanese, or English (only if some students do not understand Japanese)

Textbooks and references

[Textbook]
Nothing special. The documents are provided at each lecture.
[Reference Books]
Francis F Chen "Introduction of Plasma Physics", Springer, 1974
Markus Aschwanden "Physics of the Solar Corona", Springer, 2009
Albrecht Kruger "Introduction to Solare Radio Astronomy and Radio Physics", D.Reidel, 1979