Adam Mickiewicz University in Poznan

Doctoral School of Exact Sciences AMU

Fundamentals of Radio Astronomy

Magdalena Kunert-Bajraszewska

Field of science	Astronomy
Teaching method	Lecture
Language	English
Numbers of hours	20
Aims of the course	The aim of the lecture is to familiarize students with the principles of radio astronomy, which consists of issues related to the processes of radio emission and observational techniques used in radio astronomy, both for a single radio telescope and radio interferometric networks. The lecture will also be supplemented by a historical outline of the development of radio astronomy and a review of the latest instruments for radio observations.
Course contents	1. Historical introduction to the development of radio astronomy. 2. Fundamentals of synchrotron radiation. 3. Sources of synchrotron radiation in space. Discussion of individual groups of sources: quasars, radio galaxies, microquasars, pulsars, planets, stars (e.g. the Sun), remnants of supernova explosions, etc. and the mechanism of radio radiation generation in these sources. 4. Principle of operation of a radio telescope. Discussion of basic parameters: radio telescope beam, effective area, antenna temperature and system temperature, radio telescope sensitivity. 5. Very long baseline interferometry (VLBI). Principle of operation, multiplying and summing interferometer, correlators (including complex ones), visibility function, observation geometry, radio imaging techniques. 6. Review of radio observation instruments.
Prerequisites and co-requisites	None

Learning outcomes

On completion of the course PhD candidates will be able to:	Assessment mode
- understand observational methods and methods of data analysis and processing in radio astronomy; - understand the mechanisms of radio emission of astrophysical objects; - recognize the components of the Universe studied in the radio range and know the most important directions of development of techniques; - use radio astronomy terminology correctly; - formulate opinions on current radio astronomy research.	written exam

Literature	1. T. L. Wilson, K. Rohlfs, S. Hüttemeister, "Tools of Radio Astronomy", Springer 2. J. J. Condon and S. M. Ransom, "Essential Radio Astronomy", Princeton U.P. 3. J.M. Marr, R.L. Snell, S.E. Kurtz, "Fundamentals of Radio Astronomy. Observational methods", CRC Press 4. R.L. Snell, S.E. Kurtz, J.M. Marr, "Fundamentals of Radio Astronomy. Astrophysics", CRC Press
Additional information	