

Plasma astrophysics - course description

General information	
Course name	Plasma astrophysics
Course ID	13.7-WF-FizP-PA-S17
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2017/2018

Course information	
Semester	5
ECTS credits to win	3
Course type	obligatory
Teaching language	english
Author of syllabus	<ul style="list-style-type: none">prof. dr hab. Giorgi Melikidze

Classes forms					
The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	15	1	-	-	Exam
Class	15	1	-	-	Credit with grade

Aim of the course

The expansion of the knowledge of the basic concepts of plasma astrophysics. To transfer messages from plasma physics allowing the students to understand on a basic level some phenomena and physical processes in the magnetospheres of Earth and pulsars, and in the accretion disks of black holes and neutron stars.

Prerequisites

Knowledge of general astronomy, mathematical analysis and the basis of theoretical physics.

Scope

- Plasma in the laboratory and space.
- The basic properties of plasma.
- The kinetic equation for plasma.
- Wlasow theory of plasma waves and plasma stability.
- Plasma as a magnetic fluid.
- Generation of radiation in the plasma.
- The space plasma.
- Magnetosphere of the Earth
- Pulsar magnetosphere
- Accretion disks of black holes and neutron stars

Teaching methods

The conventional lectures, the conventional classes

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Students can describe and discuss the fundamental laws of physics plasma. The student knows, understands and is able to describe the basic physical laws that govern the magnetospheres of the Earth and pulsars, and accretion disks.		<ul style="list-style-type: none">an exam - oral, descriptive, test and other	<ul style="list-style-type: none">Lecture
The student has a basic knowledge of plasma waves and plasma stability. He can name and describe the processes occurring in the space plasma.		<ul style="list-style-type: none">an exam - oral, descriptive, test and other	<ul style="list-style-type: none">Lecture

Outcome description	Outcome symbols	Methods of verification	The class form
Taking into account their knowledge of the laws of physics, the students can solve some problems and issues of the plasma astrophysics.		• an evaluation test	• Class
They can use their knowledge and understanding of astrophysics to distinguish some of the physical characteristics of space objects.		• an evaluation test	• Class

Assignment conditions

Lecture: Oral examination; Condition assessment - a positive mark of the exam.

Classes: Written test - positive mark of the test.

Final grade: 50% exam mark + 50% exercise mark.

Before taking the exam the student must get a credit for classes.

Recommended reading

[1] *The lecture notes*.

[2] D. Melrose, *Plasma Astrophysics*, Vol. 1 i 2, Gordon and Breach, 1980.

[3] M. A. Krall, A. W. Trivelpiece, *Fizyka plazmy*, Państwowe Wydaw. Naukowe, 1979.

[4] V. L. Ginzburg, *Theoretical Physics and Astrophysics*, Pergamon Press, 1979.

Further reading

[1] *Astrophysical formulae, a compedium for the physicist and astrophysicist* (K.R. Lang), Springer-Verlag 1980.

[2] *Theoretical Physics and Astrophysics* (V.L.Ginzburg) Pergamon Press PRES.

Notes

Modified by dr hab. Maria Przybylska, prof. UZ (last modification: 30-07-2018 23:26)

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