PHYS-428 **Relativity and cosmology II**

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Cursus	Sem.	Type
Ing.-phys	MA2, MA4	Opt.
Physicien	MA2, MA4	Opt.

Language of teaching	English
Credits	5
Session	Summer
Semester	Spring
Exam	Oral
Workload	150h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

This course is the basic introduction to modern cosmology. It introduces students to the main concepts and formalism of cosmology, the observational status of Hot Big Bang theory and discusses major physical processes in the early Universe.

Content

- Basic facts about the Universe
- Red shift and Hubble expansion
- Homogeneous spaces and Friedman-Robertson-Walker metric
- Open, closed and spatially flat universe
- Matter dominated and radiation dominated Universe
- Cosmological constant and accelerated universe expansion
- Physical processes in the early Universe and the cosmic microwave background radiation
- Inflationary cosmology

Keywords

1. Expansion of the Universe
2. Hot Big Bang theory
3. Dark matter
4. Accelerated expansion of the Universe
5. Inflation
6. Cosmic Microwave background radiation

Learning Prerequisites

Required courses

Analytical Mechanics
Classical Electrodynamics
Statistical Physics I
Relativity and Cosmology I

Recommended courses

Quantum Physics III
Relativistic quantum fields I
Nuclear and Particle Physics I, II

Learning Outcomes

By the end of the course, the student must be able to:

- Estimate the lifetime of the Universe, knowing the cosmological parameters
- Formulate the main observational evidence for the hot Big Bang theory
- Describe basic cosmological epochs

Transversal skills

- Use a work methodology appropriate to the task.

Teaching methods

Ex cathedra and exercises

Assessment methods

final exam 100%

Supervision

Office hours Yes

Resources

Bibliography

1. L. Landau, Lifshitz, "The classical Theory of Fields"
2. S. Weinberg, "Gravitation and Cosmology"
3. E. Kolb, M. Turner, "The Early Universe"

Ressources en bibliothèque

- Gravitation and Cosmology / Weinberg
- The classical Theory of Fields / Landau
- The Early Universe / Kolb

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=14203