

PHYS-402

**Astrophysics V : observational cosmology**

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Cursus	Sem.	Type
Ing.-phys	MA2, MA4	Opt.
Physicien	MA2, MA4	Opt.
Space technologies minor	E	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Oral
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Summary**

Cosmology is the study of the structure and evolution of the universe as a whole. This course describes the principal themes of cosmology, as seen from the point of view of observations.

**Content**

1. A brief historical perspective: a few ancient cosmologies. Olbers' paradox.
2. The three observational pillars of Big Bang cosmology discovered during the 20th century: (i) The universe expansion; (ii) The cosmic microwave background at 3K; (iii) The abundance of light elements.
3. The metric of the universe. The spectral redshifts.
4. Cosmological models and the evolution of the universe.
5. Observational tests: the age of the universe, mean density and the problem of dark matter, nucleo-cosmo-chronology, the deep galaxy counts.
6. Recent observations of the cosmic microwave background and its power spectrum.
7. Impact of gravitational lenses on cosmology.
8. The initial phases of the evolution of the universe in the Big Bang model and cosmological nucleosynthesis.

**Learning Prerequisites****Recommended courses**

Bachelor in physics or mathematics and Astrophysics I, II and III

**Learning Outcomes**

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

- Theorize the fundamental principles of cosmology

**Transversal skills**

- Access and evaluate appropriate sources of information.

**Teaching methods**

Ex cathedra and exercices supervised in classroom

### **Assessment methods**

oral exam (100%)

### **Resources**

#### **Ressources en bibliothèque**

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#### **Moodle Link**

- <https://go.epfl.ch/PHYS-402>