ADVANCED COSMOLOGY

Màster:

ASTROFÍSICA FÍSICA DE PARTÍCULES I COSMOLOGIA

Universitat de Barcelona

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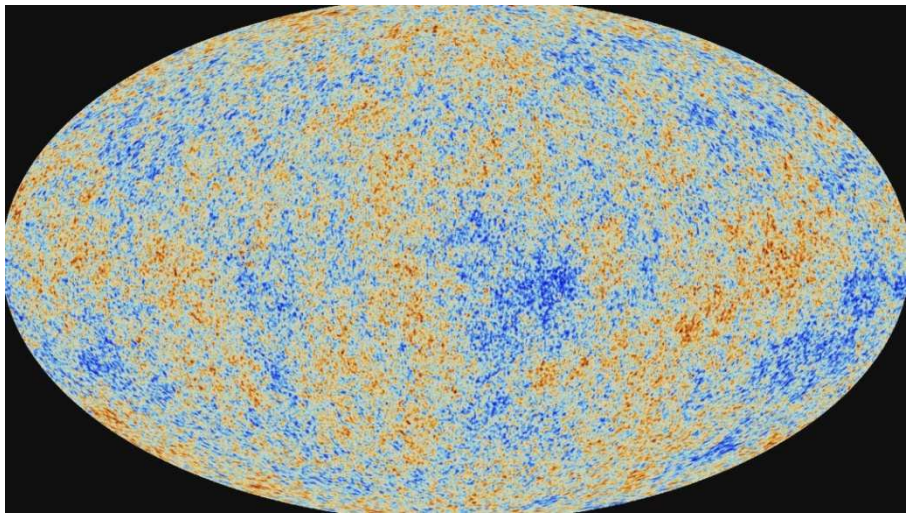


PURPOSE

1. Understand the basic elements of the standard cosmological model
2. Become familiar with dynamics and geometry of the FRW models
3. Understand observational basis of dark matter, dark energy and its theoretical framework
4. Understand origin of Cosmic Microwave Background and the light elements abundances
5. To know consequences of phase transitions in cosmology
6. Understand problems that lead to the inflationary paradigm and the main features of cosmic inflation

HOURS

The course is delivered during 12 weeks, 3 days per week, in lectures of 1.5 hours,

EVALUATION

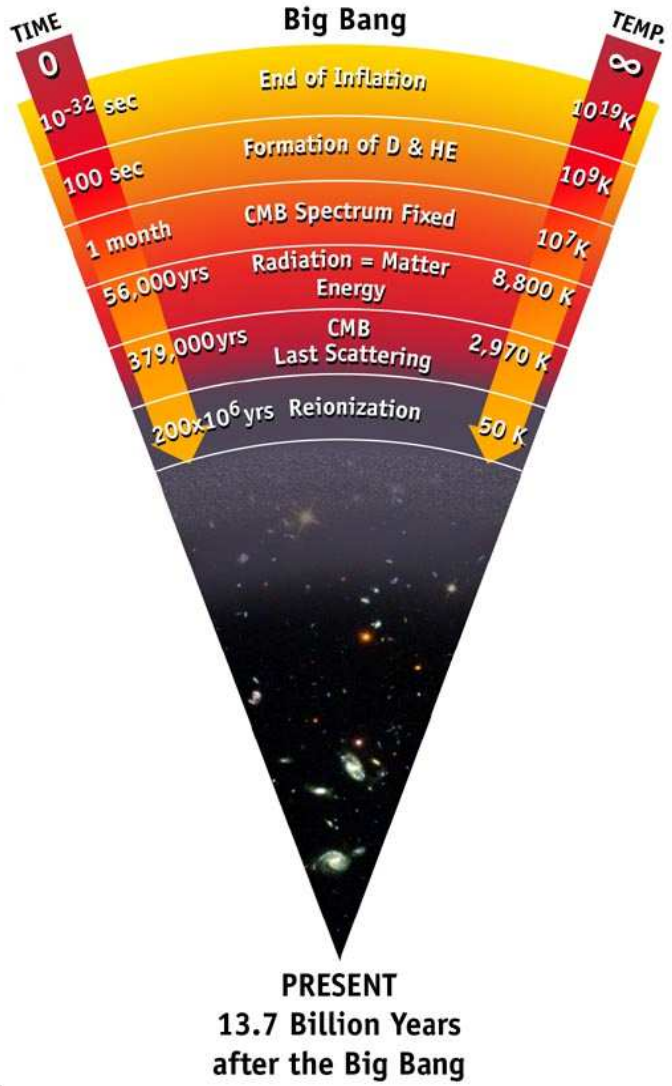
30-50 % by written partial tests
70-50 % by assigned exercises

RECOMMENDED BACKGROUND

Some working knowledge at undergraduate level of:

"Astrophysics and cosmology"
"General relativity"
"Quantum mechanics"

FIRST PART



1. The expansion of the universe

Spacetime geometry, expansion, Friedmann eqs, radiation, matter and cosmological constant

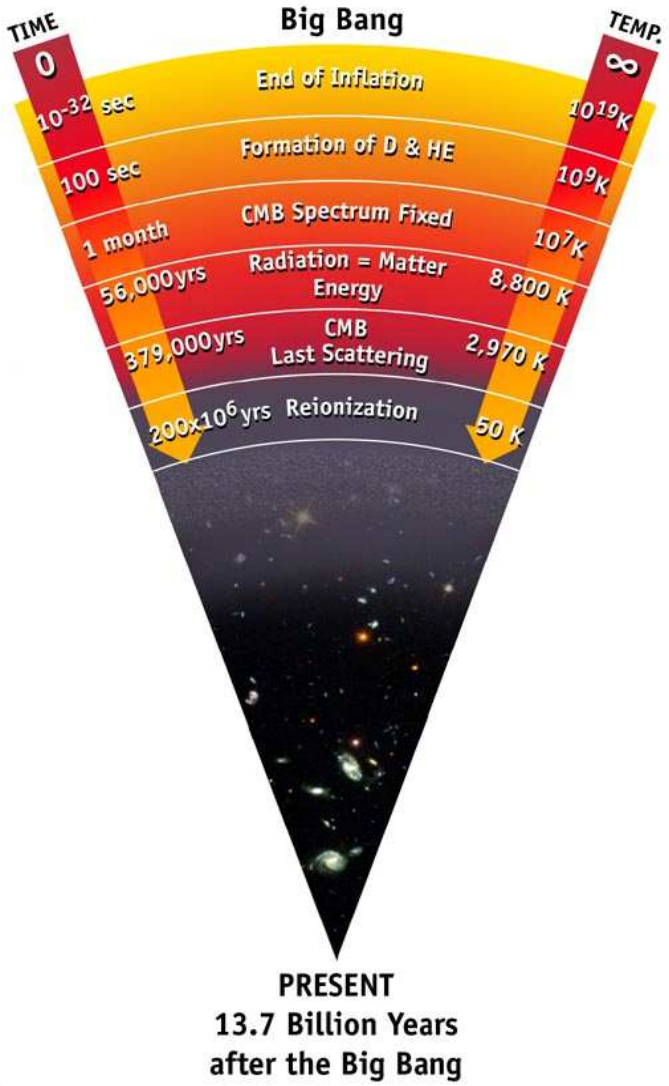
2. Observational cosmology and cosmic budget

Ages, cosmic abundances, baryon content, dark matter, dark energy, standard Lambda CDM model

3. Cosmic microwave background

Fluctuations and power spectrum, dipole anisotropies, acoustic peaks, large-scale structure

SECOND PART



4. Thermal history, nucleo-synthesis and recombination

Neutrino decoupling, neutron freeze-out, deuterium bottleneck, helium, recombination

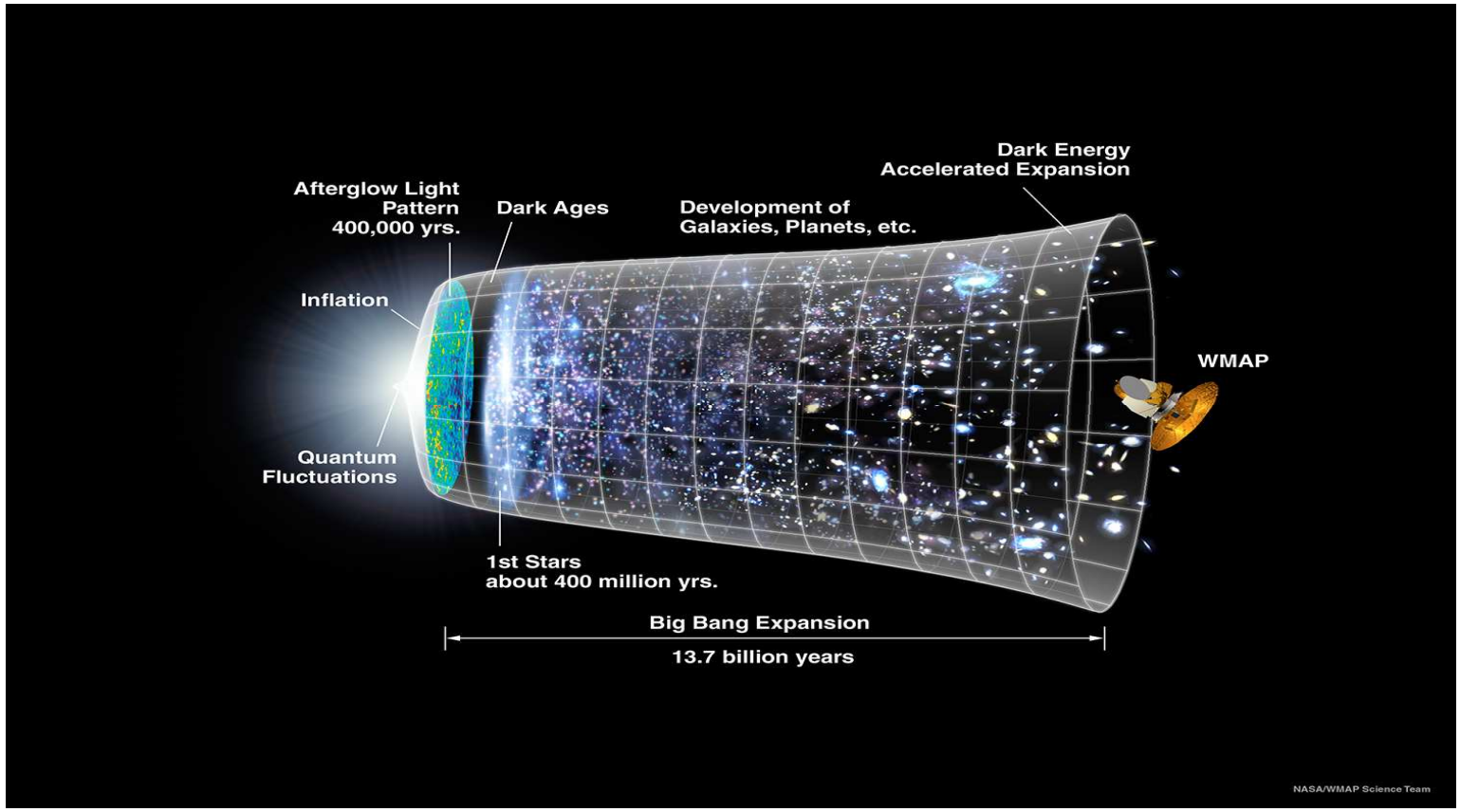
5. The very early universe

Standard model of particle physics, phase transitions, baryogenesis and leptogenesis, dark matter candidates.

6. Inflation

Flatness, horizon problems, quintessence, slow roll inflation, thermalization.

BIBLIOGRAPHY



V. Mukhanov, *Physical foundations of cosmology, CUP, 2005*

J.A. Peacock, *Cosmological physics, CUP, 1990*

B. Ryden, *Introduction to cosmology, Addison Wesley, 2003*