

“Introduction to Cosmology”

Core Course in Physics for Warsaw4PhD school.
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Summary:

This is an introductory course in Cosmology, aimed primarily at Masters and PhD students but open to anyone who would like to know more about the Universe. It will focus mainly on describing standard model of cosmology (Lambda Cold Dark Matter), its mathematical properties and the observational basis on which it stands. The course will be mostly self-contained but some parts of the course will require a basic knowledge of general relativity, thermodynamics, and advanced classical mechanics, although the main concepts will be revised.

[Wojtek unavailable in blue; Maciek unavailable in green]

Lecture outline (will be a subject of an update):

- Lecture 1 (26.02.2020): The observed Universe: a cosmos full of dark matter and dark energy

This will be an introductory lecture, introducing in a mostly popular fashion the topic of modern physical cosmology, its physical and observational foundations and principal concepts.

- Lecture 2 (4.03.2020): The background cosmological model
- Lecture 3 (11.03.2020): Cosmography and distances
- Lecture 4 (18.03.2020): The hot Universe
(*Inflation, Big Bang Nucleosynthesis and CMB*)
- Lecture 5 (25.03.2020): the Large-scale structure I
(*grav. instability, Jeans theory...*)
- Lecture 6 (01.04.2020): the Large-scale structure II
(*Cosmic perturbations of density and velocity fields*)
- Lecture 7 (15.04.2020): Halo and galaxy formation and evolution I
- Lecture 8 (22.04.2020): Halo and galaxy formation and evolution II
- Lecture 9 (29.04.2020): Galaxy clustering and redshift-space distortions

- Lecture 10 (06.05.2020): Gravitational lensing
(*strong, weak, CMB, Sachs-Wolfe effect?*)
- Lecture 11 (13.05.2020): Dark matter I
- Lecture 12 (20.05.2020): Dark matter II
- Lecture 13 (03.06.2020): Dark energy and modified gravity
- Lecture 14 (10.06.2020): Galaxy surveys
- Lecture 15 (17.06.2020): (exam?)