

Course title:

Observational Cosmology

Duration [number of hours]: 12

PhD Program [MERC/MPS/SPACE]: SPACE

Name and Contact Details of Unit Organizer:

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Course Description [max 150 words]:

This course applies the concepts introduced in Introduction to Cosmology by computing the observational predictions of cosmological theories and comparing them with observational data. Students will be introduced to the numerical tools commonly used in cosmological data analysis, with particular emphasis on Markov Chain Monte Carlo (MCMC) methods for exploring the cosmological parameter space. The course covers the use and modification of Boltzmann codes to obtain theoretical predictions, as well as practical exercises aimed at analyzing cosmological models beyond the standard scenario and interpreting the resulting constraints.

Syllabus [itemized list of course topics]:

- Introduce data/observable in cosmology
- Introduce the cosmological analysis codes
- Show you how to use the CAMB code
 - how modify the input values
 - how run the code
 - how to treat the output files
 - how modify the code for your own research
- Show you how to use the CosmoMC or Cobaya code
 - how modify the input values
 - how run the code
 - how to treat the output files

Assessment [form of assessment, e.g. final written/oral exam, solutions of problems during the course, final project to be handed-in etc.]:

An oral exam, with an exercise to solve

Suggested reading and online resources:

1. Lectures slides
2. Proposed literature references

Students should have a Linux system or a virtual machine (as MobaXterm or Cygwin or CosmoBox) with gfortran compiler.

We will use this version of CAMB: <https://github.com/cmbant/CAMB/tree/Aug2017>