

ESIPAP 2017

EXPERIMENTAL COSMOLOGY EXAM

Note: Lecture notes can be used during the exam. Do not forget to discuss your answers to the questions.

Q1. BASIC COSMOLOGICAL CONCEPTS (10 points)

1. Describe the main elements of the Big Bang theory: cosmological principle and Lambda-CDM model
2. Indicate the main cosmological parameters and their meaning
3. Briefly present the physical history of universe indicating the main epochs and physical processes
4. Briefly present main cosmological probes allowing to measure cosmological parameters

Q2. EXPERIMENTAL PROJECT (10 points)

1. Define a scientific case for a CMB **or** LSS future experiment. Do a simple sketch of what you want to measure (eg. CMB power spectrum in polarisation, SN Hubble diagram, BAO peaks, matter power spectrum, etc)
2. Define main scientific and instrumental requirements based on your scientific case.
 - **For CMB:** multiple range, needed resolution and sensitivity (extrapolate from Planck case for example), number of detectors, frequency range for observations (account for foreground emission), etc
 - **For LSS:** redshift range you want to achieve, observational frequencies (optical and/or IR), photometric and/or spectroscopy experiment, observational strategy, do you need large statistical sample (many objects), etc
3. Describe an instrumental setup and where you want to place it (ground based, balloon, satellite). Discuss your choices.