Astronomy 405

Astro 405, Intro Cosmology

3 hrs/week, lectures begin on Sept 5, 2013.

Instructor: Maxim Pospelov
Teaching Assistants: Anthony Fradette
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Recommended Text: Barbara Ryden, Introduction to Cosmology
More advanced (graduate level) books on Cosmology by the following authors:
S. Dodelson, V. Mukhanov, S. Weinberg, J. Peacock ....

Assignments

Home assignments is an important part of the course, and contribute heavily to the final grade. Make sure that you hand in the assignment on time. Late assignments are not accepted.

Grades

The course grade will be determined from various components of the course in the following way:
(a) The homework assignments will count for 30 %.
(b) One midterm exam will count for 20 %.
(c) One project will count for 20 %.
(d) The final will count for 30%.

The breakdown of grades vs the precetage points will be as per UVic regulations

NB: Use of calculators in exams. On all examinations the only acceptable calculator is the Sharp EL-510R. This calculator can be bought in the Bookstore for about $10. DO NOT bring any other calculator to the examinations.

Tentative Schedule

Part 1. Introduction

Short summary of the current state of understanding of cosmology.
Distance, time and energy scales involved
Review of (or non-technical introduction to) relevant physics: standard model of particles and fields + gravity. Relativistic theory and relativistic notations. Planck distribution.

Part 2. Evolution of the homogeneous Universe

Freidmann's Equations and their solutions. Kinematics of the expansion and contraction
Sources of energy density: radiation, matter and the cosmological constant.
Redshift, horizons, luminosity distance
FRW Universe, and the current energy balance

Part 3. Benchmarks of the hot Big Bang

Baryogenesis
Big Bang Nucleosynthesis
Possible origin of dark matter
Physics of recombination and decoupling of the CMB

Part 4. Inhomogeneous Universe

Harrison-Zeldovich power spectrum
Generation of the CMB anisotropies
Growth of cosmological structure. Linear and non-linear regimes
Possible origin of power spectrum: inflation

Part 5. Open questions in cosmology + observational aspects

Student projects