

Module: Elective Advanced Lectures: Modern Astrophysics

Module No.: astro850

Course: The cosmic history of the intergalactic medium

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Category	Type	Language	Teaching hours	CP	Semester
Elective	Lecture with exercises	English	2+1	4	WT

Requirements for Participation:

Preparation:

Basic atomic physics (hydrogen atom) and basic thermodynamics. No previous knowledge of astrophysics is required.

Form of Testing and Examination:

Written or oral examination

Length of Course:

1 semester

Aims of the Course:

The aim of this course is to familiarize students with the physics of the intergalactic medium (the material that pervades the vast regions between galaxies) and with its significance for cosmology and the astrophysics of galaxies. Thanks to progress in observations, theoretical modeling, and computational power, our knowledge in this field is growing rapidly. The main questions driving current research will be discussed and new results introduced as they occur.

Contents of the Course:

Basic: Transport of continuum and line radiation, photo-ionizations and radiative recombinations, the cooling function, the expanding universe.

Advanced: Cosmic recombination, the dark ages, hydrogen and helium reionization, 21cm-probes of the dark ages and reionization, quasar absorption systems, the UV background, the warm-hot intergalactic medium, intracluster gas, Lyman-alpha fluorescence.

Recommended Literature:

The study of the intergalactic medium is a young subject. No textbook exists for this topic. Lecture notes will be distributed.