

# Extragalactic Astrophysics and Galaxy Formation

Master on Astrophysics, Particle  
Physics and Cosmology



UNIVERSITAT DE  
BARCELONA



Institut de Ciències del Cosmos

# Course Structure

- Goal: To give the **present view** of the **structure and dynamics of galaxies** as well as their **formation and evolution in a cosmological context**, paying especial attention to the physical mechanisms involved
- Course format: Four 60-min lectures per week
- Blocks:
  - **Extragalactic astrophysics**: Dr. J.M. Solanes (18 sessions)
  - **Simulations of galaxy formation**: Dr. C. Laporte (8 sessions)
  - **Galaxy formation and evolution**: Dr. A. Manrique (18 sessions)

# Extragalactic Astrophysics

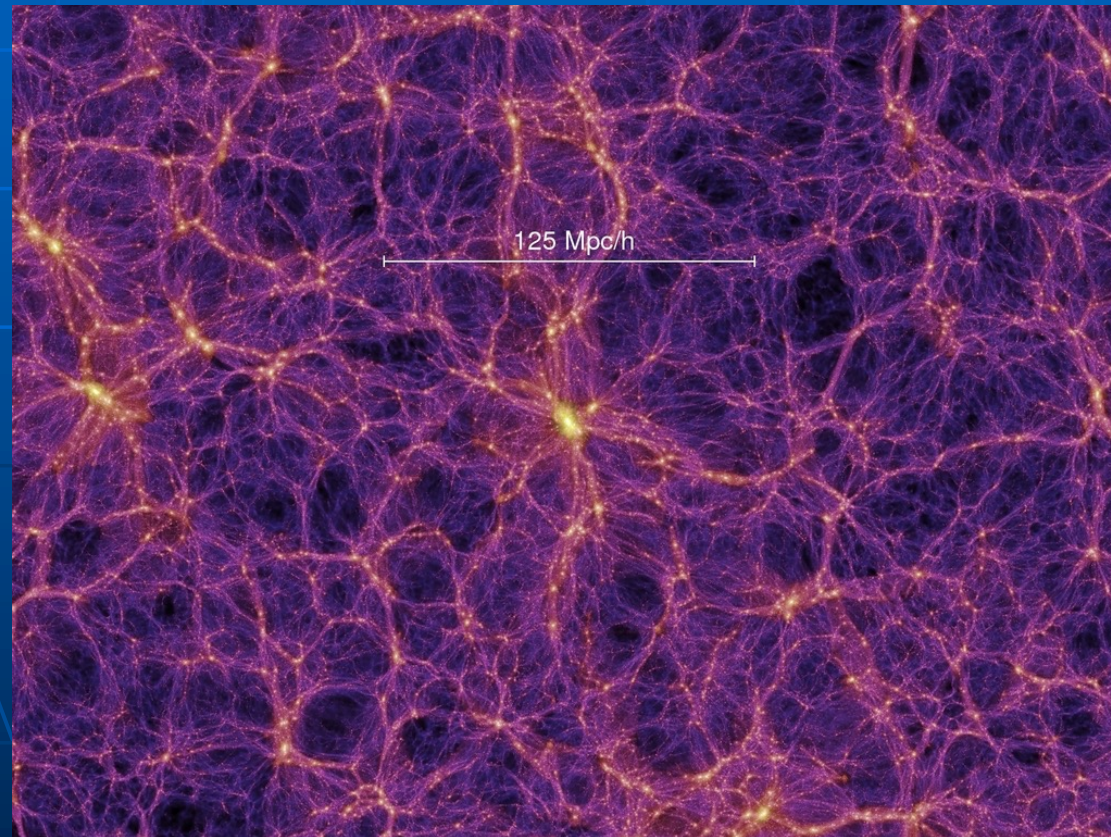


# Contents: Part I

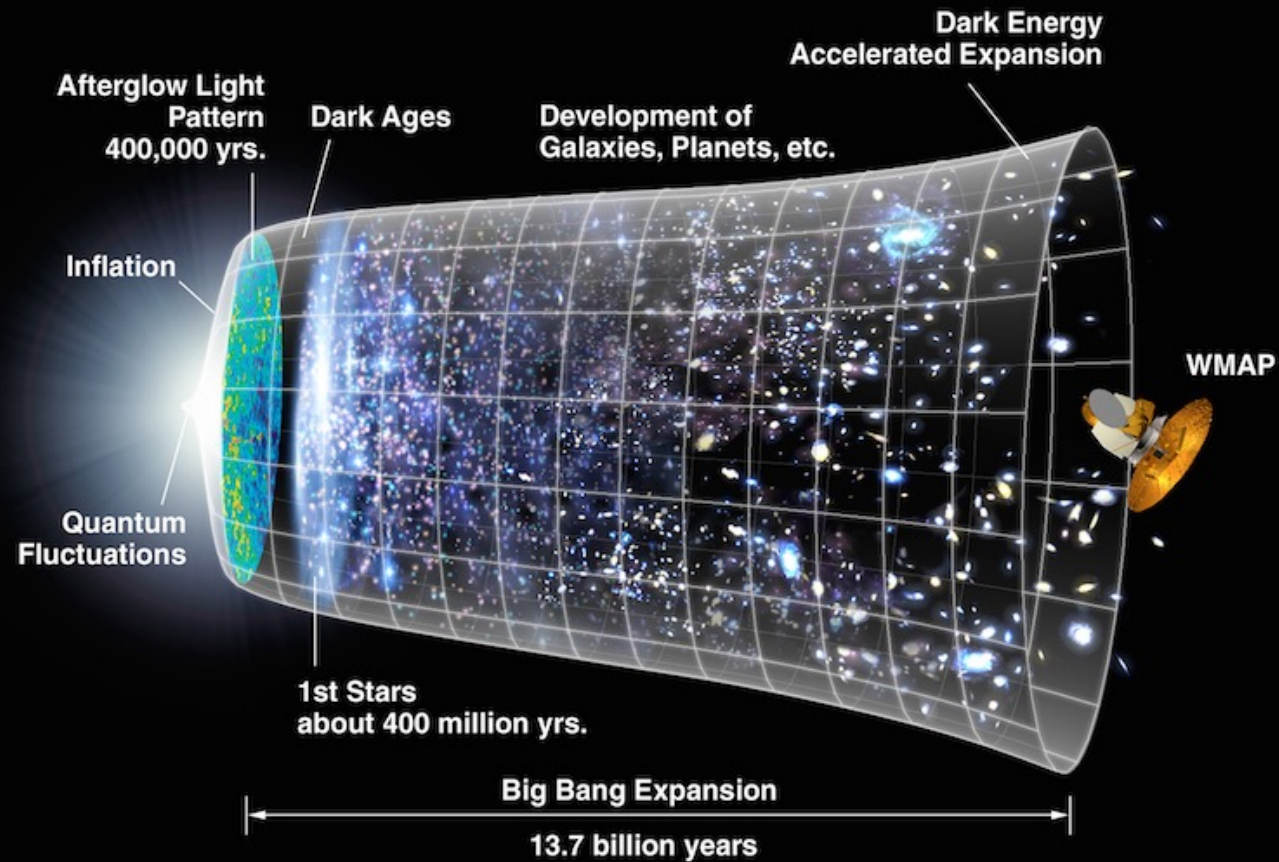
1. PRELIMINARIES.
2. INTRODUCTION TO GALAXIES.
3. ACTIVE GALACTIC NUCLEI (AGN).
4. SPIRAL GALAXIES (LTGs).
5. ELLIPTICAL GALAXIES (ETGs).
6. GALAXY GROUPS AND EVOLUTION.

# Contents: Part II

## 1. MODELING LARGE-SCALE STRUCTURE AND GALAXY FORMATION: SIMULATIONS.



# Galaxy Formation



# Contents: Part III

1. STRUCTURE FORMATION IN THE UNIVERSE.
2. COSMIC DENSITY PERTURBATIONS: LINEAR EVOLUTION.
3. SPHERICAL COLLAPSE.
4. RELAXATION MECHANISMS AND TIME SCALES.
5. DARK MATTER HALOS.
6. GALAXY FORMATION AND EVOLUTION.
7. THE HIGH-REDSHIFT UNIVERSE.

# Course Grading

- It will be based **70% on a research work**: 2-student groups will prepare (50%) and present (20%) a meeting-like poster with the results of the analysis of a galaxy cluster.
- The poster (in English) will be presented and the results explained (in English) in an oral session at the end of the semester (early July).
- The contents of the poster and the oral presentation will be evaluated according to grading sheets (similar to TFM).



# Course Grading

- The other **30%** of the grade will be based on the evaluation of a series of **tasks** that will be proposed weekly through the Virtual Campus.

# Course Material

- *UB Campus Virtual*:
  - lecture notes
  - tasks, galaxy cluster project
  - recommended readings (e.g. review papers on specific topics)
- Bibliography (textbooks):
  - **GALACTIC DYNAMICS** (2on. Ed.), Binney & Tremaine, Princeton University Press (2008)
  - **GALAXY FORMATION AND EVOLUTION**, H. Mo, S.D.M. White & F. van den Bosch, Cambridge University Press (2008)
  - **GALAXY FORMATION** (2on. Ed.), M.S. Longair, Springer (2008)
  - **GALAXIES IN THE UNIVERSE** (2on. Ed.), Sparke & Gallagher, Cambridge University Press (2007)
  - **GALAXY FORMATION AND EVOLUTION**, H. Spinrad, Springer (2005)