

# Advanced General Relativity

A course on the fundamentals of  
Gravitation and Spacetime

**Black Holes – Classical and Quantum**

**Inflation and the Origin of Structure  
in the Universe**

# Roberto Emparan

*General Formalism*

*Black Holes*

*Quantum Gravity*

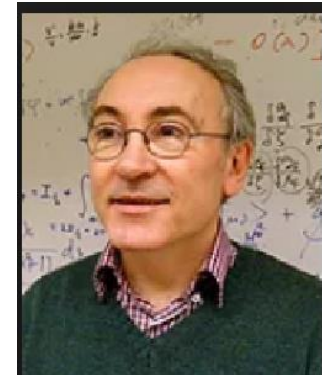


# Jaume Garriga

*Relativistic Cosmology*

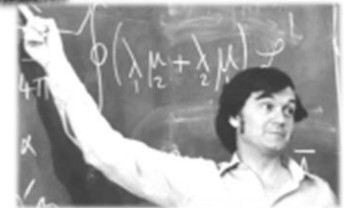
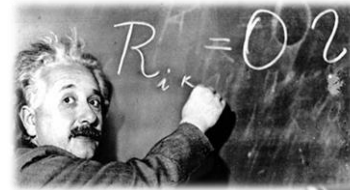
*Inflation*

*Cosmological perturbations*

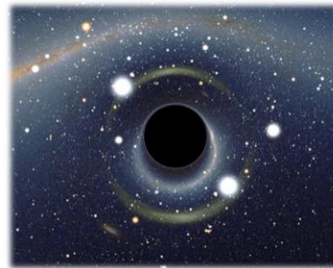


Pre-requisite: Introductory course to  
General Relativity

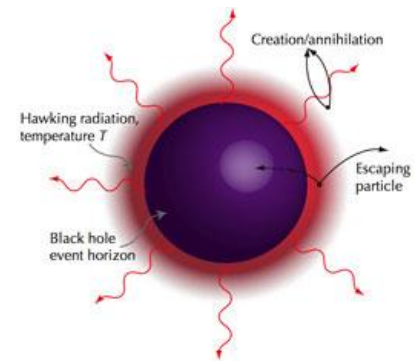
# What will you learn?



- Advanced techniques in GenRel
  - Lagrangian formulation, Causal Structure (Horizons)...



- Black Holes
  - Classical theory
  - Quantum effects – Hawking radiation
  - Black hole thermodynamics

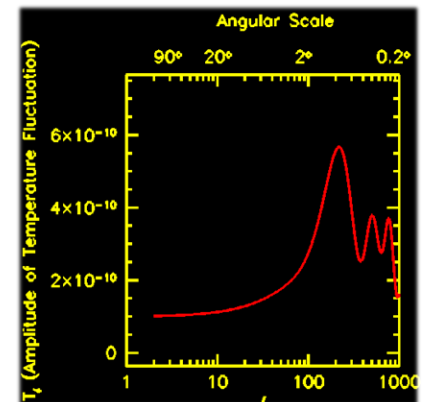
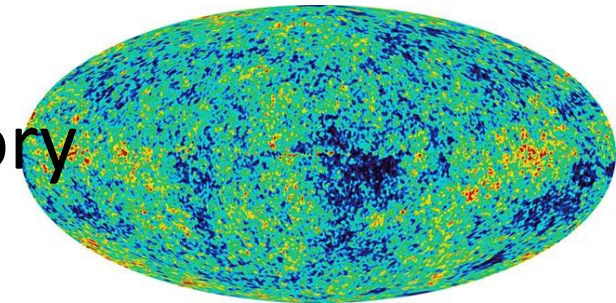
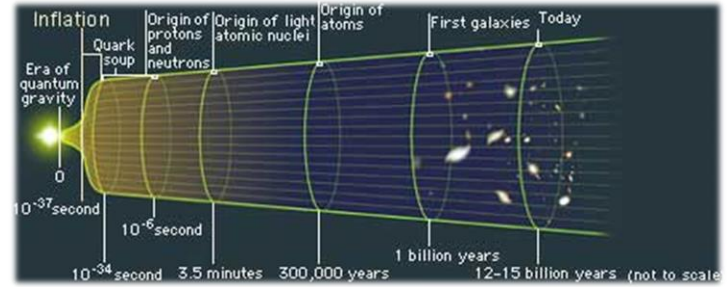


- Basic notions about Quantum theory of Gravity



# What will you learn?

- Relativistic Cosmology
  - FRW universe
  - Inflation
- Cosmological perturbation theory
  - Cosmic Microwave Background
- Inflationary Universe
  - Origin of primordial fluctuations & large-scale structure



# What is the course like?

- Theoretical – be ready for math
- On blackboard – we'll go into details
- Homework (weekly)
  - complement to lectures
  - essential practice
  - evaluation\***

\* alternatively, exam if requested