

UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Relativistic Astrophysics

2122-1-F5802Q003

Aims

Application of fundamental concepts of special and general relativity to the field of astrophysics

Contents

1- Basics of special and general relativity

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Detailed program

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III- GRAVITATIONAL LENSING

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IV- GRAVITATIONAL WAVE (GW) EMISSION

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V- TIMING OF MILLISECOND PULSARS

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VI- FORMATION, EVOLUTION AND DYNAMICS OF MASSIVE BLACK HOLES (MBHs)

2- MBH growth along the cosmic history

3- Formation and evolution of massive black hole binaries (MBHBs)

Prerequisites

None, besides the basic classes of the bachelor

Teaching form

56 hours of frontal lectures, mostly at the blackboard, occasionally with the support of slides.

Lectures will be in English.

Textbook and teaching resource

Supporting material will be uploaded on e-learing during the course of the semester, in any case here follows an (incomplete) list of useful references.

I- SUMMARY OF SPECIAL AND GENERAL RELATIVITY

Barbara Ryden, "Introduction to cosmology", Chapter Barbara Ryden, "Introduction to cosmology", Chapter 12: http://carina.fcaglp.unlp.edu.ar/extragalactica/Bibliografia/Ryden_IntroCosmo.pdf Abraham Loeb, "First Light": https://arxiv.org/abs/astro-ph/06003360 2-First baryonic structures: seed black hole formation Marta Volonteri, "Formation of supermassive black holes": https://arxiv.org/abs/1003.4404 S-MBH growth along the cosmic history Celoria et al., "Lecture notes on black hole binary astrophysics": http://dasabs.harvard.edu/abs/2018arXiv180711489C King et al., "Aligning spinning black holes and accretion discs": http://dasabs.harvard.edu/abs/2005MIRARS.3349K J. Binney & S. Termaine, "Galactic Dynamics", 1987 (dynamical friction, loss cone theory, stellar hardening) D. Merritt, "Dynamics and Evolution of Galactic Nuclei", 2013 (dynamical friction, loss cone theory, stellar hardening) V- GRAVITATIONAL WAVES FROM BINARY SYSTEMS Semester	
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Assessment method

Oral examination. The student will first be asked to elaborate on a topic of his choice for about 15-20 minutes. In

the rest of the exam, the lecturer will ask other questions covering any of the topics treated in class.

There will be no intermediate examinations nor homework.

Office hours

Any day is possible, so long as an appointment is requested via email. I generally use Google Meet for remote meetings.