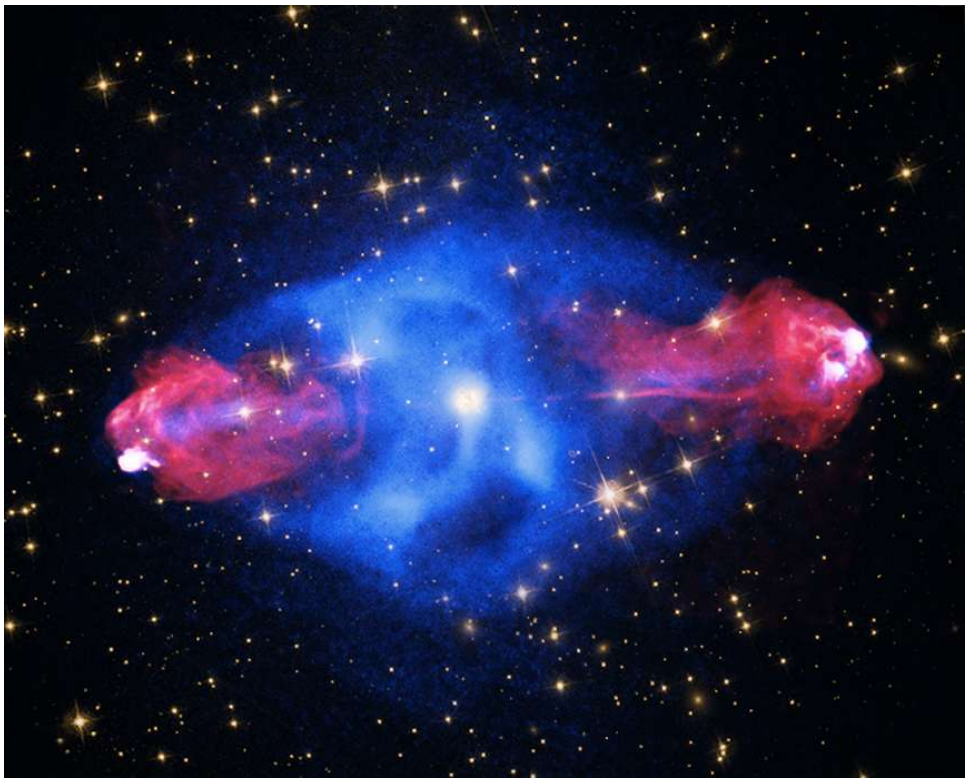
Department of Physics and Astronony "Augusto Righi"University of Bologna

Basic Information

Master degree: Astrophysics and Cosmology

Course: 96395 Radioastronomy - 6 CFU



Mondays	**11 – 13**	**AULA H**
Tuesdays	**16 – 18**	**AULA H**

Rec: Tue & Thur 15:30 – 17:00

Exam: Oral, 3 questions, first chosen by the candidate

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N.B. Please send your e-mails from your account @studio.unibo.it <<<<<

Summary of radiation mechanisms (what photons we do [not] observe)

Radiotelescopes: single dishes & interferometers (how do we detect "radio" photons)

– ***Galactic Radio Astronomy*** *[i.e. Astrophysical bodies (at large)]:*

– **Cosmic magnetic fields**

– The **Interstellar Medium** *(in spiral galaxies), gas dynamics, heating/cooling, star formation*

– The **sun**, the stars and the **radio stars**

– **Supernova Remnants**

– **Pulsars** & **Microquasars**, ***FRB*** *& transients*

– The galactic centre **(SgrA*)** and the "core" in spiral galaxies, **elliptical galaxies**

– **Extragalactic Radio Astronomy**

strong / faint populations, ***radiogalaxies*** *and information beyond their morphology, Young/compact objects, gravitational lenses, individual radio source evolution*

clusters of galaxies *and the physical processes at work in radio galaxies; diffuse radio sources, G/m halos, shocks, GreETs, Phoenices, latest news" on filaments, etc.*

Wide overview of many physical processes and astrophysical bodies

Involvement of the Italian astrophysical community in ongoing "radio" projects: LOFAR, MeerKAT, MWA, ASKAP, SKA. Do not forget "conventional instruments" (JVLA,GMRT,VLBI)

Interest in Master thesis projects *(leading to PhD projects)* *https://info.ira.inaf.it/en/job-and-study/thesis/*

DIFA staff members related to radioastronomy:

Annalisa Bonafede, Virginia Cuciti, *(clusters of galaxies, radio source physics, galactic and intergalactic magnetic fields)*

Myriam Gitti *(Interaction thermal/non-thermal plasma, cavities, clusters of galaxies, jelly fish galaxies)*

Franco Vazza *(numerical simulations of clusters of galaxies, cosmic ray physics, prediction/comparison with observations, filaments, large scale structures)*

Daniele Dallacasa *(clusters of galaxies, radio source evolution, radio source physics, giant radio galaxies, high z radio sources, radio strong lensing)*

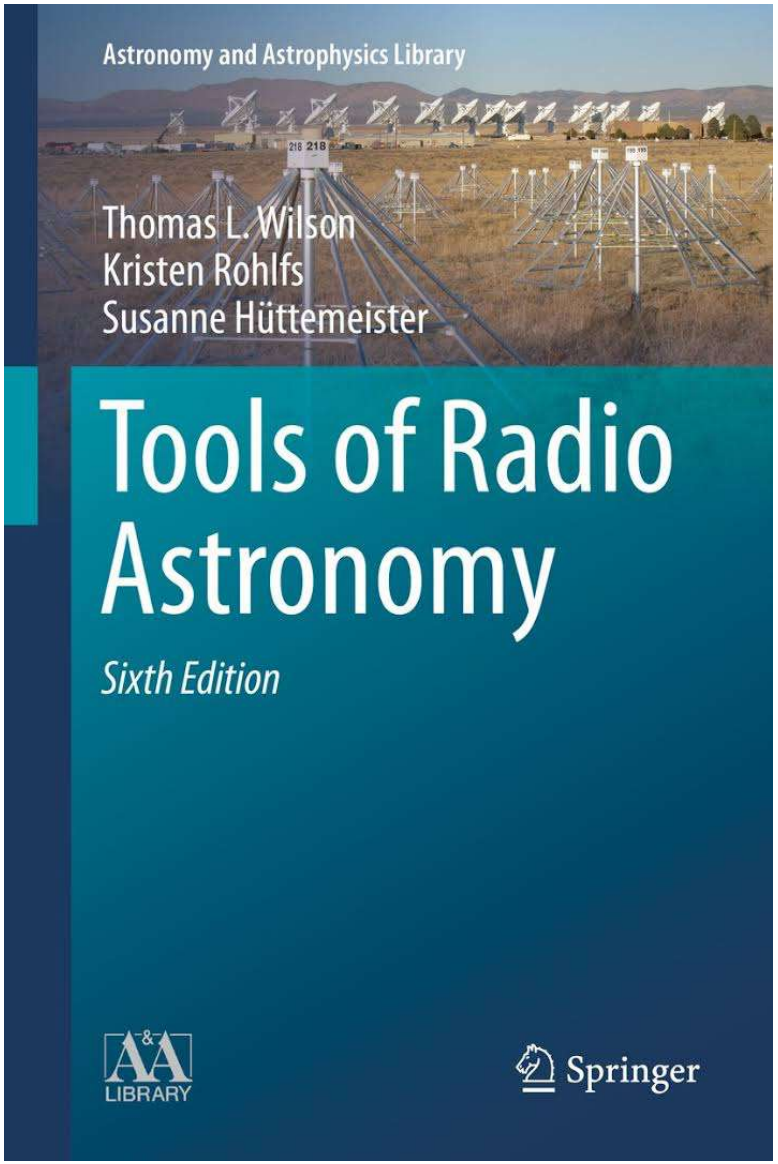
Leonardo Testi *(protoplanetary disks, ALMA science)*

More than a dozen of PhD students & posDocs (@IRA INAF, along with young researchers...)

PDF file: http://www.ira.inaf.it/Library/e-books/Fanti&Fanti-Papers.pdf (in Italian, sorry!)

Wilson, Rohlfs & Huettemeister:

Tools of Radio Astronomy



Various review papers for each specific argument.
The updated inventory is provided in the slides at the proper location.
That literature can be also used for preparing the first argument to be discussed during the exam.

Useful references for recap of astrophysics:

- **Longair:** **High Energy Astrophysics**
- **Rybicky-Lightman:** **Radiative Processes in Astrophysics**

Slides are available @
http://www.ira.inaf.it/~ddallaca/Radioastronomy.html

Pay attention!

They are slides,
they are NOT lecture notes!

Department of Physics and Astronomy

Master degree in Astrophysics and Cosmolgy

96395: Radioastronomy AY 2021/22 Still under construction (most links

Handouts of the NEW slides (they are NOT lecture notes!)

00RadioA_Intro	Introductory lecture, references, motivation, description of topics
01RadioA_recap	Recap of Emission mechanisms, radio sources & plasma effects
02RadioA_Instr	Detectors & instruments for Radioastronomy
03RadioA_ISM	InterStellar Matter, Spiral Galaxies, Rotation Curve, Oort constants
04RadioA_Mol	Molecules in the ISM (& external galaxies), Star Formation
05RadioA_YSO	Young Stellar Objects & Maser emission (also in SG stars)
06RadioA_RSt	Radio Stars
07RadioA_SNR	Supernovae & SuperNova Remnant
08RadioA_Pul	Pulsars (and Fast Radio Bursts)
09RadioA_muQ	Microquasars
10RadioA_MW	The Milky Way and SgrA*
11RadioA_SBp	Starburst galaxies; Deep fields, radio source populations
12RadioA_RSE	Radio Source Physics and Evolution
13RadioA_RGa	Radio Galaxies: FR - I & II RGs (FR0 as well!)
14RadioA_Clu	Clusters of Galaxies & the (non-thermal) physics of the InterGalactic Medium