Astronomische Waarneemtechnieken
[Astronomical Observing Techniques 2013]

Based on lectures by
Bernhard Brandl

Albert Einstein

Edwin Hubble and James Jeans at the 100-inch telescope on Mt. Wilson.

Outline

1. Course Content
2. Web Page
3. Books
4. Schedule
5. Exam and Grades

Course Goal

Understand
the state-of-the-art techniques
that are used
to observe the universe.

Physics of Object

Radiation Transport

Atmosphere

Telescopes

Adaptive optics

Astronomical instruments

S/N of detection

Radiative Processes (E. Rossi)

properties of light
radiometry,
magnitudes,

This course →

transmission, seeing,
speckles, refraction,
scattering and
dispersion

types, mounts,
wavelength ranges,
space telescopes,
optics

Image formation

principle,
components,
guide stars

Spectrometers,
detectors,
interferometers,

Course Overview

1. Basics of Observational Astronomy:
   - Properties of radiation (black body, radiometry)
   - Atmospheric properties (transmission, emission, scattering, dispersion)
   - Telescopes (reflector, refractor, mounts, foci, ground/space telescopes)

2. Theoretical Background/framework:
   - Fourier transform (definition, properties, 1D/2D examples, theorems)
   - Geometrical & diffraction optics (image formation, PSF, aberrations, …)
   - Measurement properties (signal-to-noise, sensitivities, sampling)

3. Specific Techniques and Components:
   - Radio Techniques (basics, antennae, receivers)
   - Detectors (physical basis, photo-conductors, bolometers, heterodyne)
   - Spectrometers (spectral information, dispersing elements, types)
   - Adaptive Optics (principle, components, laser guide stars, types)
   - Interferometry (speckle interferometry, visibility, types)

People

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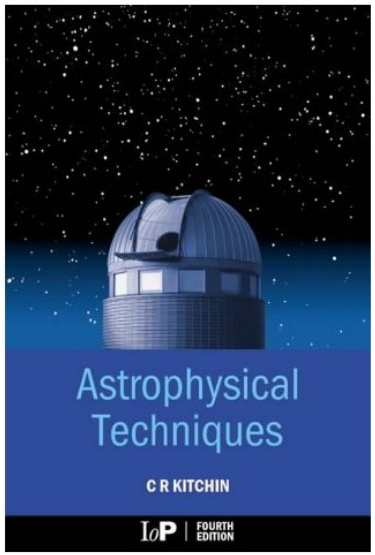
Course Web Page

www.strw.leidenuniv.nl/~keller/Teaching/AOT_2013

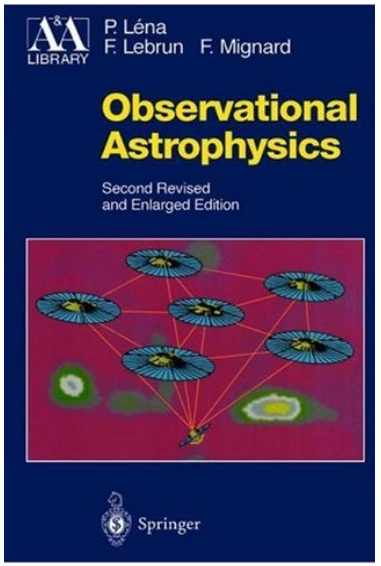
- contact information
- course schedule
- lecture presentations, exercises, exercise materials

Recommended Literature



No book is formally required, but further reading is highly recommended!

➔ Library



- Observational Astrophysics, by Pierre Lena, 3rd edition, 2012, published by Springer, ISBN 978-3-642-21814-9
- Astrophysical Techniques, by C.R.Kitchin, 5th edition 2008, published by Institute of Physics Publishing, ISBN 978-1420082432

Schedule

Day	Time	Room	Type
Tuesday	11:15-13:00	HL 414	Lecture
Thursday	12:15-14:30	HL 204	Exercises

- Frequent deviations from this schedule
- Check course web page for details

Exam & Grading

Written exam at the end (9 Jan. 2014) to test your knowledge and UNDERSTANDING of the subject matter.

Weekly exercises must be followed to:

- Apply and practise the newly acquired knowledge
- Improve your exam grade by up to 1 point [if exercises are done well]

In Case of Questions ...

If anything remains unclear, then ...

1. ... ask during the lecture
2. ... study the handout notes after the lecture
3. ... read the recommended literature
4. ... ask Stephanie during the exercises
5. ... visit Stephanie or me in the office
6. ... have problems with the exam