

AGA5802

Introduction

Prof. Alessandro Ederoclite

Before we start...

It should not be needed but:

I certainly hope you will not feel the urge to use your mobile during class.

I know you believe you can do two things at the same time but it is highly distracting for me.

In case it's a case of life or death (or I allow it for any specific reason), you can use the mobile.

Let me please introduce myself

I am a man of well and taste

Born in Rome (Italy) in 1977

PhD in Physics in Trieste (2006)

Post-doc in Brussels (2006), ESO (2007-2008; duty station: La Silla, supporting all instruments), IAC (2008-2011; GTC/OSIRIS)

Staff astronomer at ceFca (2011-2018; head of SciOps at OAJ; commissioned all telescopes and instruments)

Professor at IAG since 8 August 2018

Before we start...

I would like to know a little about you!

- Name Alessandro Ederoclite
- Career Status Professor Doutor
- Favourite SciFi Character Lt.Cmdr. Worf (Star Trek TNG, DS9)
- Favourite Starship TARDIS
- Football Team F.C. Inter (Milan, Italy)

Entry Level Questionnaire

<https://forms.gle/cKEP9zW8yWkCRxng7>

Goals (free translation from Janus)

Give the graduate student fundamental notions about the instrumentation used in Astrophysics, as well as observation techniques, data acquisition and reduction. In particular, give the student the conditions to plan the use of instrumentation in order to achieve determined scientific results.

Understand how observations are carried out. It is relevant, of course, if you go to observe but also if you use data from a project (e.g. SDSS).

*It is useful also for theoreticians who will want to test their theories (“It doesn't **matter** how beautiful your **theory** is, it doesn't **matter** how smart you are. If it doesn't agree with experiment, it's wrong”, R. Feynmann)*

Program (from Janus)

Effect of the Earth atmosphere on observations in the optical and near infrared

Telescopes and image quality

Effects of the interstellar medium

Detectors

Techniques of Radioastronomy

Photometry

Spectroscopy

Elements of Polarimetry

Acquisition and manipulation of data

Space astronomy - X-rays

My Program

Coordinate systems

Effect of the atmosphere on astronomical observations (extinction and seeing)

Proposing and planning observations

Telescopes

Properties of CCD detectors

Basic techniques of image reduction

Notions of aperture photometry

Spectroscopy

Astronomy at other wavelengths than optical (incl. Radioastronomy and Space satellites)

Useful References

- Roy & Clarke - “Astronomy; Principles and Practice”
- Kitchen - “Astrophysical Techniques”
- Léna (et al.) - “Observational Astrophysics”
- Howell - “Handbook of CCD Astronomy”

Articles and instrument manuals that I may eventually refer to.

Dates

Lectures are on:

- Wednesdays; 4pm - 6pm
- Fridays; 2pm - 4pm

We allow 5 minutes of “courtesy”

My office is D-309 ; email aederocl@iag.usp.br

If the door is open and I am not talking to someone, you are free to enter.

If the door is closed either I am not in the office or I cannot be disturbed.

Dates

I have three observing runs at Observatorio Pico dos Dias which conflict with this course:

- 13th - 15th April
- **12th - 15th May ** you are all “welcome” to join; USP will pay the transportation and I am arranging lodging at OPD with LNA**
- 28th June - 1st July

There will be a J-PAS meeting the week between 1st and 5th June (you are all invited to participate).

Examinations and Grading

You will be graded on the basis of three “tests”:

1. Propose observations (it is going to be harder than you think)
2. Carry on the observations @ OPD
3. Reduce, analyse and interpret the data

I will then give you an oral examination (last week of courses)

Grades will depend on the outcome of the tests and the activity in class.

How I compute the marks

$$m = \sum_{i=1,2} w_i m_i + w_o m_o + G$$

w_i weight of test i

m_i mark of test i

w_o weight of oral

m_o mark of oral

G arbitrary factor (between 0 and 0.5) for participation in class

How to share notes?

Do you use eDisciplinas?

Do you prefer Google Drive?

I had a very good experience with eDisciplinas last year and I would love to keep using it.

A few quick reminders; Units of Measure

Length

- International System:
 - metre
- Astronomy:
 - Astronomical Unit ($\sim 140 \times 10^6$ km)
 - Lightyear
 - Parsecs

Mass

- International System:
 - kilogram
- Astronomy:
 - Gram
 - Solar Mass ($\sim 2 \times 10^{33}$ g)

A few quick reminders; Units of Measure

Time

- International System:
 - second
- Astronomy:
 - Second
 - Year
 - Gyr = 10^9 yrs

Energy $E = F * l = (m * a) * l = m * l^2 * t^{-2}$

- International System:
 - $J = kg \ m^2 \ s^{-2}$
- Astronomy:
 - erg