

Title:
Techniques for Observational Astronomy

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Subjects:

The work of an astronomer is strictly related with a wide range of professional resources and programming tools.

- We introduce to the students the basics of photometric and spectroscopic observations in optical astronomy.
- We go step-by-step through a typical workflow of an observation, starting from the preparation of a telescope observation using the most rated webtools.
- In the second part, we face the time request process for a professional ESO telescope, and the subsequent phase of preparation of the so-called "Observation Block". We then propose to the students to mock this process by writing a proposal and preparing an observation with the OARPAF telescope.
- In the third part, students will perform their own observation at OARPAF.
- Finally, we introduce the astronomical archives where previous observations can be retrieved. We present the standard file format used in astronomy, and how to manage it with the typical tools and the astropy package. Students will use these resources to analyze and present their data.

Detailed program

0) Photometry and spectroscopy

- Photometry: How a CCD works: noise sources, artifacts and defects.
- Photometric techniques and best practices in observations and data reduction.
- Spectroscopy: Absorption and emission lines. Broadening of the spectral lines.
- How a spectrograph works: slits, prisms and grisms, resolution.

1) Prepare an observation:

- Introduction: Celestial coordinates, typical unit of measurements;
- Optimize telescope observations using a visibility chart: StarAlt webtool;
- Create a finding chart: using the Sky Atlas Aladdin;
- Inspect objects in a stellar field: using the Astronomical Catalog Vizier;
- Retrieve physical/orbital information about objects: use the Astronomical web Database Simbad;

2) Use a telescope to observe:

- International telescopes, local telescopes and their instrumentation.
- Observations with an international telescope: ask for telescope time by writing an Observation Proposal.
- Setup a series of operations with a professional telescope: compile an Observation Block with ESO P2.
- Observation with a local telescope: prepare your own observation with the OARPAF telescope.

3) Telescope (photometric) observations:

- A night at the telescope: observe at OARPAF your own project.

4) Astronomical data and software for astronomy

- Image archives: Hubble Heritage, Ross, IA2
- Understanding astronomical standard format: FITS files and how to manage them with astropy.
- Data Reduction and analysis with astropy and related packages.