Laurea Magistrale Interateneo in Fisica AA2018-19:
LAB OF ASTRONOMICAL TECHNOLOGIES - 6 CFU ∼ 72h
PART OF Prof.: Marisa Girardi – 3CFU

SUGGESTED BOOKS: Fundamental Astronomy, Karttunen et al.; "To measure the sky", Chromey. Handbooks for the computational and data reduction practicals. Other interesting books: "Principles and Practice", Roy and Clarke; "Astrophysical Techniques", Kitchin (advanced). MANY PRACTICALS in linux environment at the informatics laboratory of LAB-INFIS (Dept. of Physics - Univ. of Trieste, ubuntu op. system).

This year the long-term topics related to the final exam are: 1. Astrometry of an image given by the teacher; 2. Photometry and/or star/galaxy classification or study of a light curve (data given by the teacher); 3. Calibration and redshift measure of a NTT galaxy spectrum with IRAF using data given by the teacher; 4. Kinematics/structure of Milky Way using SALSA radio measures of HI clouds, that is to show that velocity=const using the data of the I quadrant, map using above all the data of II and III quadrants (data taken during the lecture or re-taken by the student itself). The student will select and discuss one of these topics.

Astronomical Measurements and Quantities

Hints of Spherical Trigonometry. Celestial Coordinates: horizontal system; equatorial system and the sidereal time; visibility of stars and circumpolar stars; ecliptic system; galactic system, angular separation and cos formula, perturbations and effects of atmosphere. Exercises on coordinates and magnitudes. (BOOKS: Karttunen).

Optics for Astronomy and Astronomical Telescopes

Simple telescopes. Image quality: telescopic resolution and optical aberrations. Telescope mounts and drives. Reflecting telescope optics. Telescopes in space. Ground-based telescopes. (BOOKS: Karttunen 3.2; Chromey 5(part) and 6).

Catalogs and web archives

Name, catalogs, databases, stellar maps and finding charts. (BOOKS: Karttunen 2.12 p.39-42 Chromey cap.4 p.105-117 (interesting tables) KarttunenCat.ps, ChromeyCatTab.ps). The use of several web-sites for literature, catalogs, and data archive: ADS, arXiv, CDS/Vizier, NED + Practical/Homework. See Moodle.

FITS format of images and DS9 visualization

Astronomical images and their FITS format: HDU, Header, Data Unit. Array and operations with arrays. WCS. CCD (a short introduction, Chromey p.236). The use of the DS9 tool for visualization and treatment + Practical/Homework. Moodle+stuff in flashUSB.

Astrometry and Photometry and GAIA tool

Astrometry of astronomical images and the use of GAIA + Practical/Homework. Basics of Photometry: standard stars, instrumental magnitudes, calibration and zero-point correction. Photometry of stars and galaxies. The use of GAIA, in particular for aperture photometry. Practical/Homework with the light curve using on GAIA or software by Prof. Cristiani. Object detection and catalogs using GAIA. Starlinks BOOKs, Moodle +stuff in flashUSB.

CCD reduction of images and Spectra calibration and IRAF tool

IRAF tool and its application to images. Basics of CCD reduction of images (bias,dark,flat). Spectra calibration: trace and extract the spectrum, identification of arc lines, calibration, redshift measure. Moodle +stuff in flashUSB.

Outdoor and Remote Observational Activities with collaboration of Dr. Giulia Iafrate

Presentation and use of the instrumentation at the local Astronomical Observatory of OATS/INAF at Basovizza: the SVAS Telescope Celestron C14 and the Solar Telescope Coronado HELIOS 1. Image acquisition of several astronomical objects: e.g., nebulae, variable stars, recent supernovae and their host galaxies. During the day: image acquisition of the Sun. The use of Radio SALSA Onsala Telescope in remote to measure the velocity of the HI clouds in the Milky Way. See Moodle and refs. therein.