

# F. Berrilli: astrophysics laboratory

*<http://www.fisica.uniroma2.it/solare>*

An experimental approach to introductory astronomy. Goals for this class include the implementation of observational techniques, the development of data analysis skills using IDL software, and learning to use a CCD/CMOS based acquisition system.

3h (Lesson) + 4h (Lab) per week



# Observational Astronomy Basics

- Horizon coordinates
- Photometry
- Atmospheric absorption and transmission (static)

## Optics Basics

- Paraxial Formulas
- Imaging Properties of Lens Systems
- Lens Combination Formulas



# Telescope Design

- Introduction
- The astronomical (lens) telescope
- Reflecting telescopes
- Telescope mounts
- CASE STUDY: design of a two-mirror telescope



# CCD and CMOS detectors 1

- Semiconductors
- Basic principles of CCDs and CMOSs
- Charge storage
- Charge-coupling and clocking
- Slow- and Fast- scanning, cooling, and optimization



# CCD and CMOS detectors 2

- Clock voltages and basic electrical factors
- The analog signal chain
- The Correlated Double-Sampling
- Noise sources
- Characterization and Calibration of array instruments: The Photon Transfer Curve

