

Lab 9. CLEA Spectroscopy

Equipment

- Computer; CLEA Software

Mini Lecture prior to Lab

- If you have not done it for the CLEA photometry lab, please explain to the students of observing at national observatories, how to apply for telescope time, how to prepare for the observing run, and how to do the actual observing in the console room.
- Please compare and contrast photometry and spectroscopy – what information does one obtain with each method? When would you use which one?

General Procedure and Lab Setup

- No Setup is needed, only the computer.
- The lab instructions are relatively self-explanatory (students can do it on their own or at home).
- Part I – obtaining Spectra. Using a large telescope for part I definitely speeds up this lab.
- Part II & III – classifying spectra. If the students do not finish part III, please save their data from part I on disk and let them continue this lab at home. However, this option tends to be rather tedious because the data will have to be transferred into specific subdirectories of the Spectroscopy Program. The Do-at-Home version has instructions on how to install program on the students' home computers – but this will end up being much more work.
- Part IV – determining absolute magnitudes and distances; plotting HRD. Part IV can be done as homework – it is mostly a repeat of the last part of the CLEA photometry exercise (the questions in the Lab Report try to make the connection to the photometry lab).
- Parts I to III involve obtaining and cranking through data. If students have previously done the CLEA photometry exercise they will not need so much overhead time to learn the program. Nevertheless, many students do not like reading instructions. This Lab really is not difficult, but work intensive – the students will need to focus on getting the data.

Notes & Suggestions

- This exercise can be done without much thinking, only through pushing buttons on the keyboard or mouse, so please watch out that the students make a connection to what they are doing and why.
- If you have graded the photometry labs, please return them to the students – it might be a good reference for the CLEA Spectroscopy lab.
- Also, please make the connection between the photometry and spectroscopy labs – all of them deal with plotting an HRD (though the current lab focuses more on the methodology of reducing and classifying spectra)

General Concepts & What students might get out of this Lab

- A sense of how modern day astronomers use telescopes and reduce data.
- Experiencing that cranking through data can get rather monotonous and boring if they lose touch of the bigger picture; yet that cranking through data is a large part and essential to the work of astronomers.

Scientific Methodologies

- A sense of how to use a computer to speed up and simplify stellar classification – this becomes particularly intuitive if they did the previous extra stellar classification (extra credit) lab.
- How to use computer programs to minimize the human subjectivity factor (though this will not have helped significantly with the extra stellar classification (extra credit) lab).