

AST325 Project

1 Goals

The AST325 project for this year is to evaluate the accuracy and consistency of radial velocity and profile measurements taken with the SGS spectrograph on the 16-inch telescope, in the context of an undergraduate class.

The idea is to measure the root mean square deviation of observed velocities compared with the known velocities of a set of bright IAU late-type velocity standard stars. The accuracy of line profiles will also be tested by observing a hotter star.

A further exercise involving the imaging CCD on the 12-inch at Scarborough will be carried out later this month provided that the system is fully functional.

2 Observing Procedure

Students will be assigned into pairs, and each pair will observe 9 bright stars (8 radial velocity standards and a telluric/profile standard). The stars are all bright and the radial velocity stars are non-variable. The list of stars is attached.

The rapidly-rotating B star Regulus also be observed for two purposes: to detect telluric (terrestrial atmospheris) absorption, and to check the accuracy of line profile measurements.

We are not particularly concerned with sensitivity because the CCD will be replaced immediately after this project is finished.

At the start of observing, turn on the telescope power via the RoboFocus window, then on the SkyGuide computer, put the telescope into Start mode, then follow with Land Mode, and Align from Previous Position, at which point the telescope should be tracking in Celestial mode. If syncing is required, first sync on a bright object (e.g. Jupiter), then go to a star about +35 degrees in declination and near the meridian and sync again. Note that syncing is done with the existing TPOINT model (i.e. the last, "not recommended", option presented by TheSky).

The high dispersion grating will be used, set to a central wavelength of 6350 Å, allowing for the wide H α line in Regulus while including useful cool star lines.

Each star should be observed for 10 minutes, with the cooling set to -25C. You may want to take two 5-minute integrations. A 5 minute comparison exposure should be taken for each star immediately before or after the stellar exposure(s). You should also take 4 flat field exposures before or after observing. Four or more 5 and/or 10 minute dark exposures should be taken during the night (10 minutes if you are taking 10 minute stellar exposures). You also should take a number of biases during the night: these are quick.

Make sure that the star is not near the edge of the main CCD. You may need to put the star nearer one end of the slit in the viewer CCD for it to be more centred on the spectrum CCD. The star does not have to be in the middle, just sufficiently away from the edge to allow accurate sky subtraction and spectrum extraction.

Keep a detailed log of your observations, preferably in a permanent notebook.

At the end of your observing session, transfer all your data to the "ungrad" Linux computers. Also, execute the "Park" command on SkyGuide three times before turning off the telescope power.

3 Reductions and Report

Further directions will be distributed to the class.