

Lab 9 - Applications of SGS Spectrograph

Purpose

In Lab 9 we gather more spectral data using the SBIG SGS Spectrograph and ST-7 CCD camera. For all SGS imaging procedures, refer to ASTR 203 Lab 9 p.36-37.

Procedure

Using TheSky6, choose four target stars of different spectral types, each 2nd to 4th magnitude. (i.e. B, A, G, M).

Take 5-minute exposures of each star, centered on the H α (hydrogen) region at 6562Å. Immediately take a 1-minute calibration spectrum of each, using the neon lamp, and save to the same folder.

Photograph the same 4 stars on a different night, centered on the Na (sodium) region around 5890Å. (the SGS will be re-calibrated). Take a 5-minute image of each star, and immediately take a 2-minute calibration spectra using the mercury lamp, and save to the same folder. All data will be processed and analyzed in Lab 10.

Planetary Spectra

Image Jupiter and Venus as available during semester, with the SGS centered on the H α region at 6562Å. Autoguiding is possible using the bright reflection just left of the planetary disc, in the SGS image. The autoguider should be binned 1x1 for these images. Bin 1x1 prevents the guide chip from noticing, and drifting toward the bright planet, during the exposure.

Take 1-minute exposures (Jupiter and Venus are extremely bright). Immediately take 1-minute calibration spectra using the neon lamp, saved to the same folder. These will be used to measure the planet's Doppler shift and radial velocity relative to Earth.

http://en.wikipedia.org/wiki/Doppler_effect We can also explore other regions in the spectrum such as methane (CH₄) and ammonia (NH₃) on Jupiter.

Jupiter

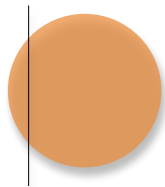
Optionally, to measure the rotational velocity of Jupiter, create a folder and take two separate images of your planetary target. Be sure the equatorial plane is perpendicular to the slit. For Jupiter this can be determined by the orbital plane of the moons.

In the first image, locate the slit near the left side of the target's disc. Initiate **autoguiding** (bin1) and take a 1-minute image. Immediately take a 30 second neon calibration exposure, and save to the same folder.

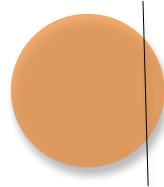
Take a second 1-minute image, with the slit located near the right side of the disc, equidistant from the edge, to the first image. Immediately a 30 second neon calibration exposure, and save to the same folder.

Take two images of Jupiter:

1- Slit left side



2- Slit right side



This procedure is best performed on nights of steady seeing, to allow more consistent placement of the slit. Planetary images will be processed and analyzed in Lab 10.