

# SOL - Solar Spectroscopy

## Signature Sheet

Student's Name \_\_\_\_\_ Partner's Name \_\_\_\_\_

### Suggested reading to start with (see the end of the manual for more):

1. 111B SOL manual
2. Chapters 1-4 of "Handbook of CCD Astronomy," S. B. Howell, Cambridge University Press. Pay special attention to 3.4-3.8, 4.2-4.3, and 4.5.
3. "To Measure the Sky," F. R. Chromey, Cambridge University Press.
4. McLean, [Electronic imaging in astronomy](#).

### Pre-Lab Discussion Questions

It is your responsibility to discuss this lab with an instructor before your first day of your scheduled lab period. This signed sheet must be included as the first page of your report. Without it you will lose grade points. You should be prepared to discuss at least the following before you come to lab:

1. Explain what spectroscopy is. How do spectral lines tell us about the presence of certain elements? What are Fraunhofer lines?
2. How does a CMOS camera work, and how does it differ from a charged coupled devices (CCD) camera?
3. What is dark current? What is read noise? How will these affect your measurements in this lab?
4. What are Kirchoff's three spectral laws? How is this relevant to the spectra of gas emission lamps as opposed to solar spectra?
5. What is the spectral resolution of our instrument? Determine the formula to calculate this, and explain how to experimentally determine it.
6. Explain the purpose of each of the optical components used in this lab.
7. Show mathematically why the sky is blue. (This should involve deriving the cross section for Rayleigh scattering; you may find Griffiths' *Electromagnetism*, Ch. 11, 'Radiation,' helpful.) How does this differ from Mie scattering?
8. Install AstroPy on your laptop and complete [this tutorial](#) (show a GSI your plots following the tutorial).

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Completed before the first day of lab? (Circle one) Yes / No

### Mid-Lab Discussion Questions

1. By day 3, you should have completed optical alignment and the wavelength to pixel calibration. Show a GSI/instructor a cleaned spectrum for each of the gas lamps and a fit for your wavelength to pixel calibration.

Staff Signature \_\_\_\_\_ Date \_\_\_\_\_

Completed by day 3 of lab? (Circle one) Yes / No

### Checkpoint Signatures

1. Dark current and readout noise

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2. Wavelength to pixel calibration and alignment Part I.

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3. Cleaned image

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4. Spectral resolution

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5. Wavelength to pixel calibration Part II.

Staff Signature \_\_\_\_\_