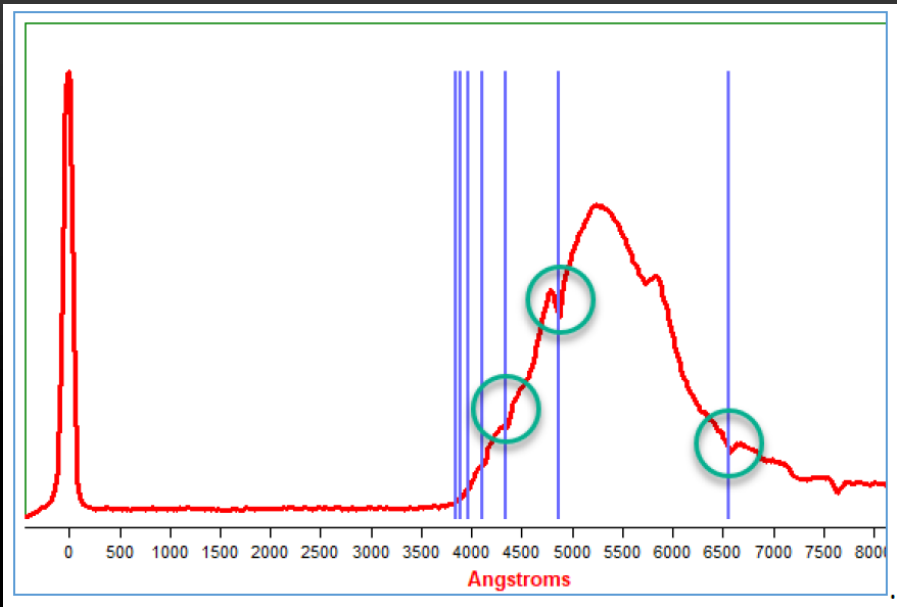


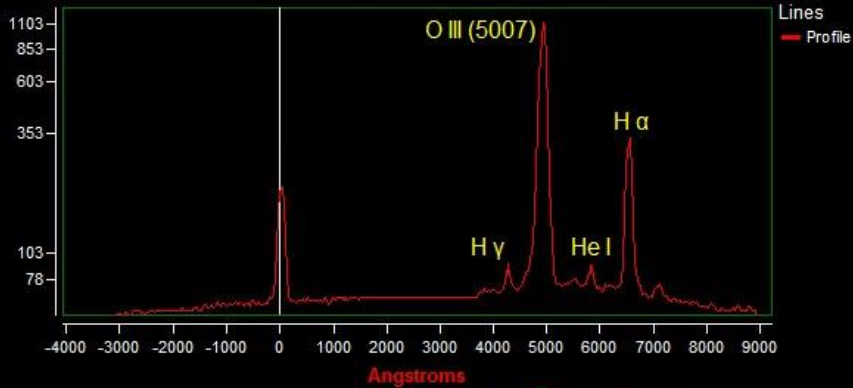
DIY Astronomy – DIY Astronomical Spectroscopy –

Doug Holland



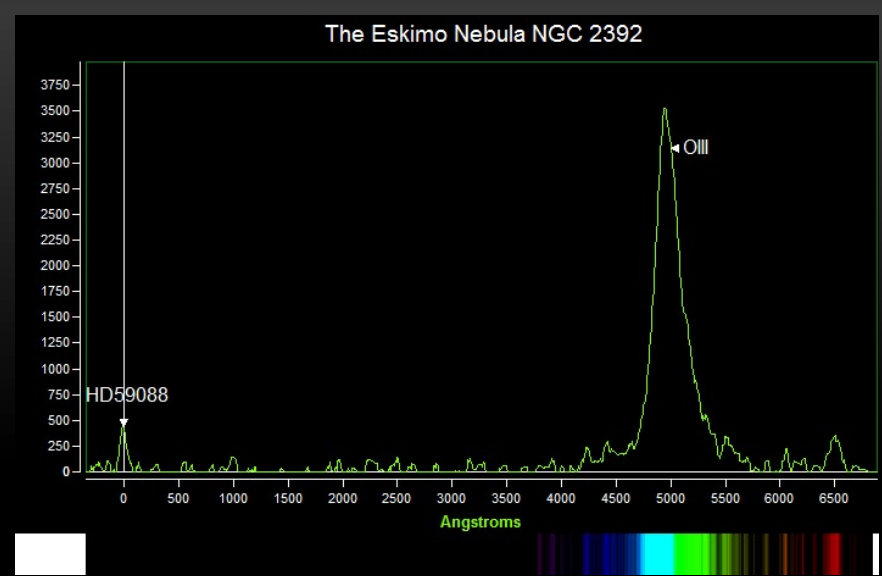
Stellar Spectra

NGC 7009 - The Saturn Nebula



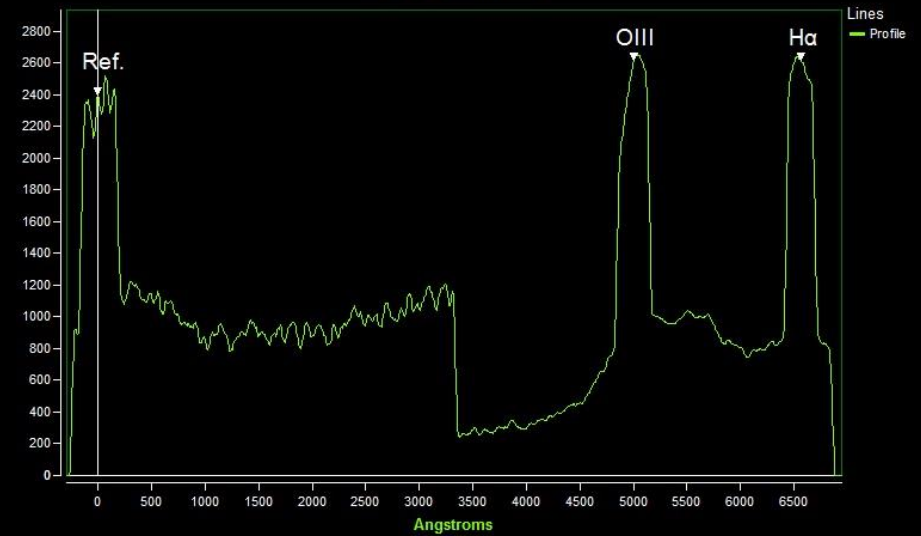
Planetary Nebula

WHAT CAN BE ACCOMPLISHED =>



Planetary Nebula

Orion Nebula M42



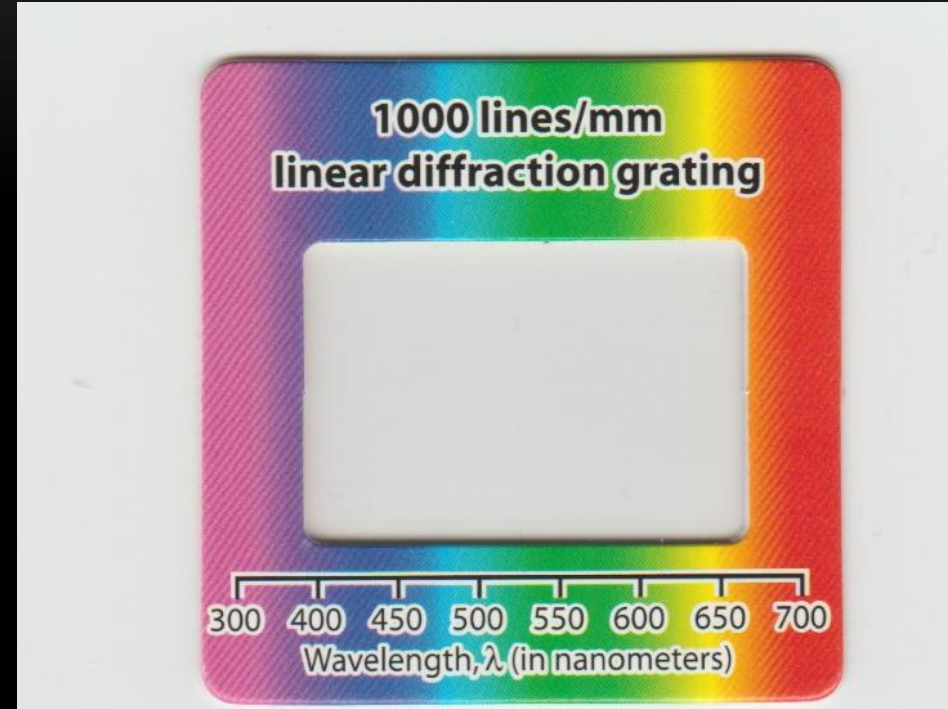
Emission Nebula

From RSpec Web Page – Not my spectrums

Ways to spread light into its spectrum

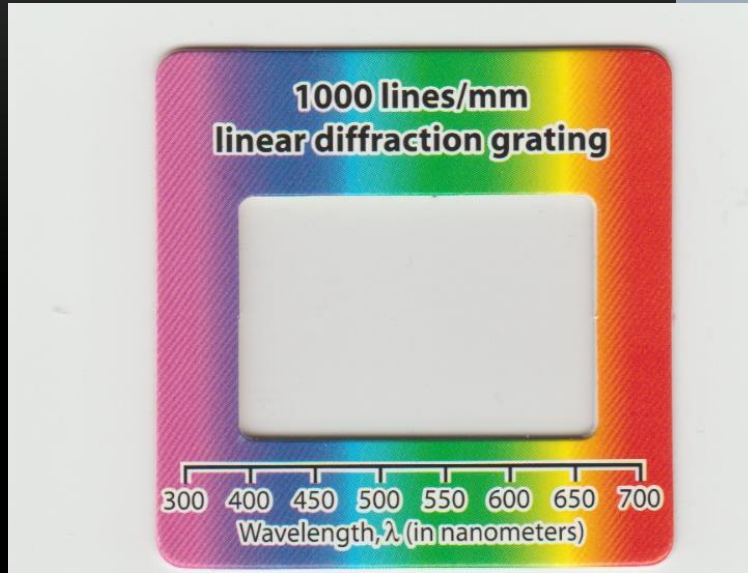


Prism



Diffraction Grating

SPECTROSCOPY YOU CAN DO



RSpec Star Analyzer 100 Grating, \$195
100 lines / mm



Spacing from diffraction grating to sensor: approx. 70mm

RSpec AD-T2 DSLR Adapter, \$42



Adapts diffraction grating
(Star Analyzer 100) to
T-thread / 42mm



RSpec webpage has calculator to select telescope

Input

1. Telescope Aperture	<input type="text" value="203"/>	<input type="text" value="mm"/>
2. Telescope Focal Ratio	<input type="text" value="8"/>	<input type="text" value="f"/>
3. Seeing	<input type="text" value="3"/>	<input type="text" value="arcsec"/>
4. Grating	<input checked="" type="radio"/> Star Analyser 100 <input type="radio"/> Star Analyser 200	
5. Grating to Sensor Distance	<input type="text" value="70"/>	<input type="text" value="mm"/>
6. Camera Pixel Size	<input type="text" value="5.2"/>	<input type="text" value="um"/>
7. Camera Width	<input type="text" value="4272"/>	<input type="text" value="pixels"/>

Ok

For additional help on these 3 fields, please see: [link](#)

Want some help? The calculator can be a little overwhelming when you first see it. We can help! Send Tom your equipment list and he'll plug it into the calculator, sending you a free report that recommends the best configuration for you to use. Click on this [link](#) to get started. Why not?!

Output

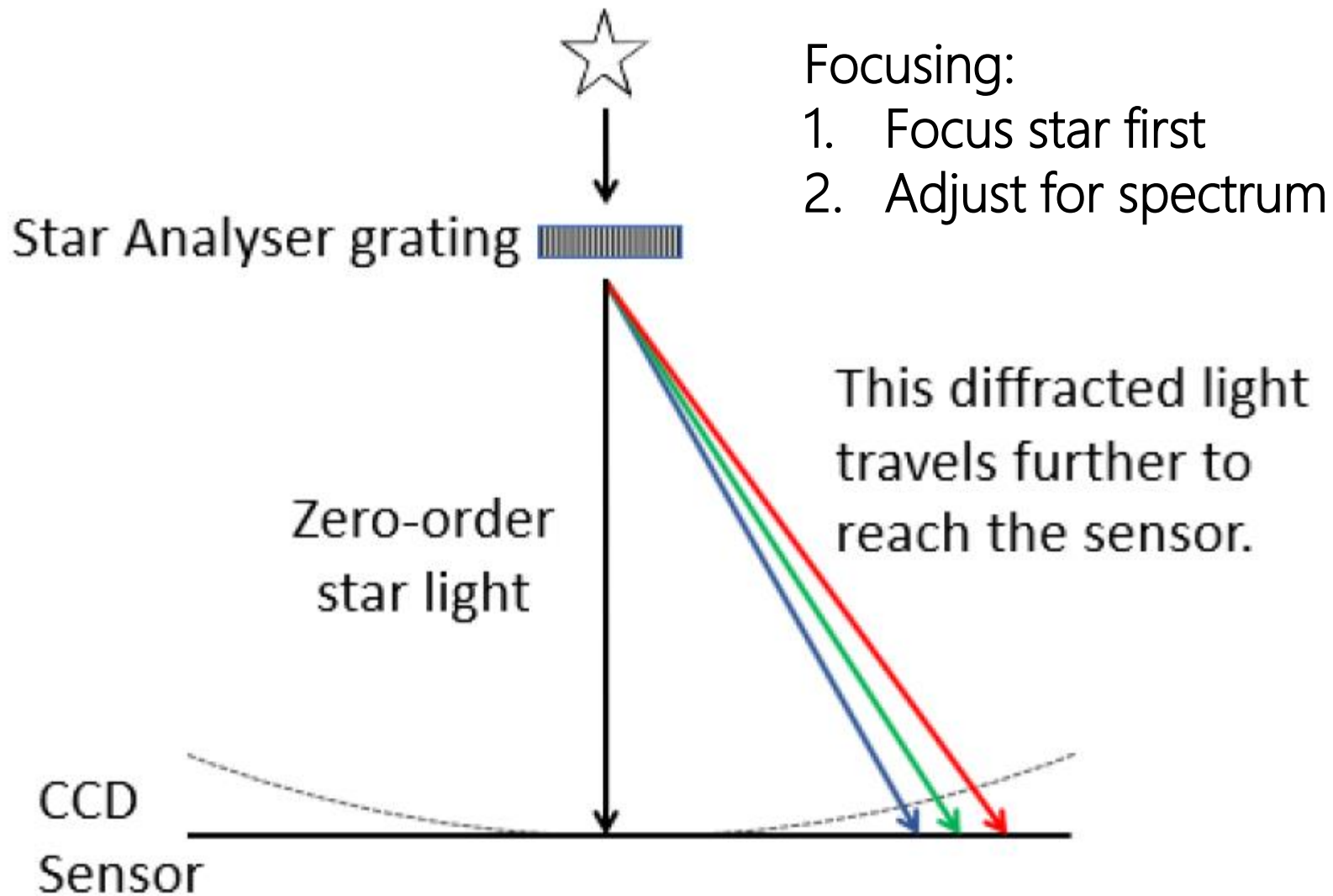
8. Telescope Focal Length	<input type="text" value="1,624"/>	<input type="text" value="mm"/>
9. Star Image Size	<input type="text" value="4.5"/>	<input type="text" value="pixels FWHM"/>
10. Dispersion	<input type="text" value="7.4"/>	<input type="text" value="Angstroms/pixel"/>
11. Spectrum Coverage, 0 to	<input type="text" value="31,735"/>	<input type="text" value="Angstroms"/>

Ok

Ok

Reset

Telescope Selection Calculator



From Rspec Web Page

RSpec - C:\Users\sdh\Pictures\BackyardEOS\200228_Sirius_Spectrums\SIRIUS_SPECTRUM_LIGHT_Tv1-20s_400iso_+13c_SA100_00264stdev_20200228-21h29m04s961ms.CR2 Trial days remaining: 25

File Edit View Tools Help

MY FIRST ATTEMPT =>

Profile

Lines Profile

1569

Move both

1814

Move bottom

Reset

To Zoom: Position your mouse cursor on the spot in the image to which you want to zoom. Then either use your mouse roller-wheel or use the + and - keys.
To Pan side-to-side: Hold the left mouse button down and move your mouse.

Calibrate Appearance Reference

Controls

Measure

Show Measure Lines

Re-calc Barycenter:

Pixel:

Angstrom:

FWHM:

Eq. Width:

Area under curve:

Auto-Scale Y-Axis

Use second X-Axis

Use second Y-Axis

Average - 5

Show Focus Tool

Logarithmic Y-axis

Synthesize

Rotate - 355.0 Subtract background

Live Camera Video File Image File

C:\Users\sdh\Pictures\BackyardEOS\200228_Sirius_Spectru Auto-Open new files

RSpec Astronomical Spectroscopy Software – 30 day trial, \$109 after that.



Elements

Elements Details

- Argon
- Calcium
- Carbon Stars
- Comets
- Fraunhofer
- H2O
- Helium
- Hydrogen Balmer
- Iron and Magnesium
- Krypton
- Laser
- Mercury
- Methane
- Nebula
- Neon
- Relco Basic
- Relco Extended
- Sodium
- Star Type O
- Star Type B
- Star Type A
- Star Type F
- Star Type G
- Star Type K
- Star Type M

Select All Unselect All A+ A- Close

Show Balmer Series

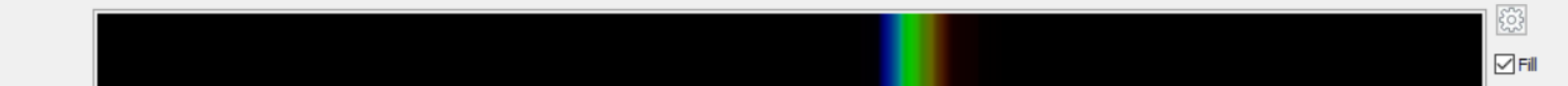
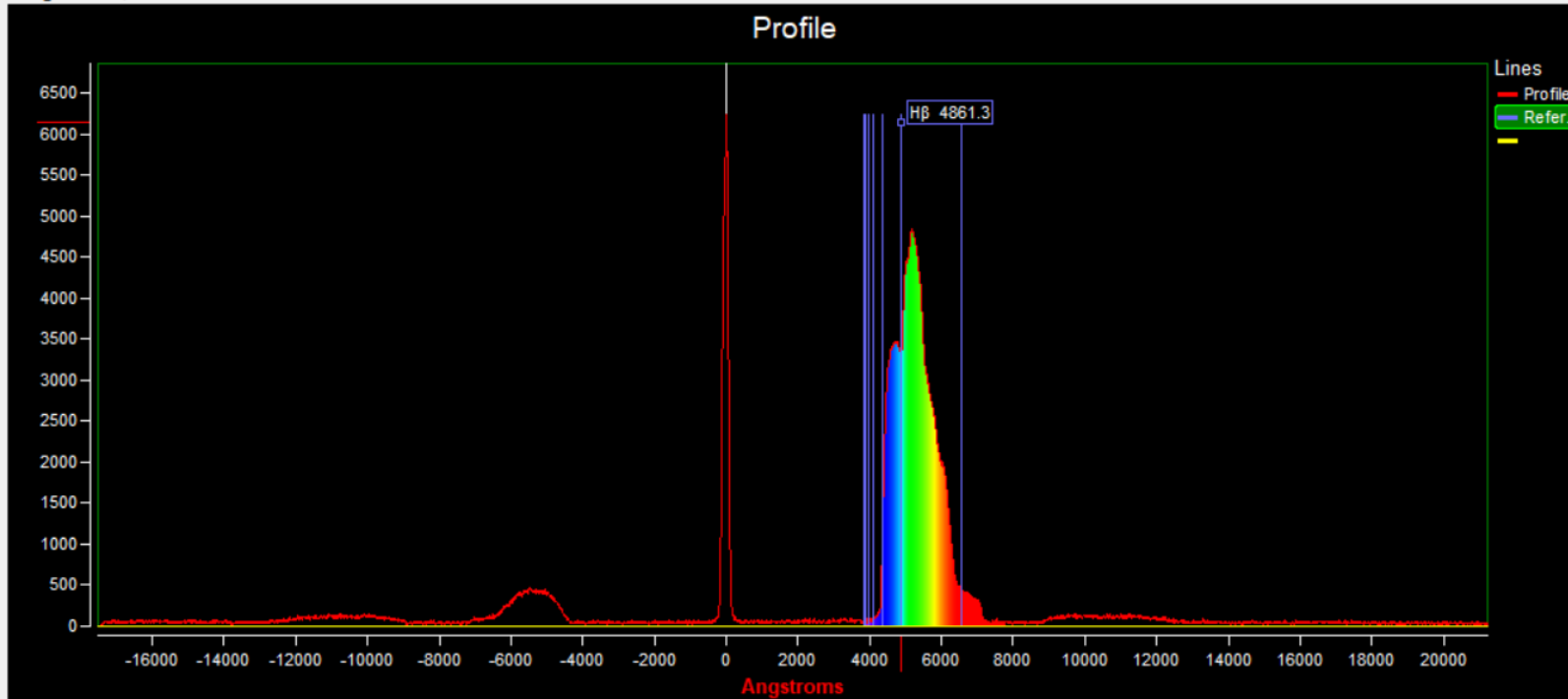
Live Camera Video File Image File

C:\Users\sdh\Pictures\BackyardEOS\200228_Sirius_Spectru Open

Auto-Open new files



Angstroms/Pixel: 9.1



Calibrate Appearance Reference

Measure

Show Measure Lines

Re-calc Barycenter:

Pixel: []

Angstrom: []

FWHM:

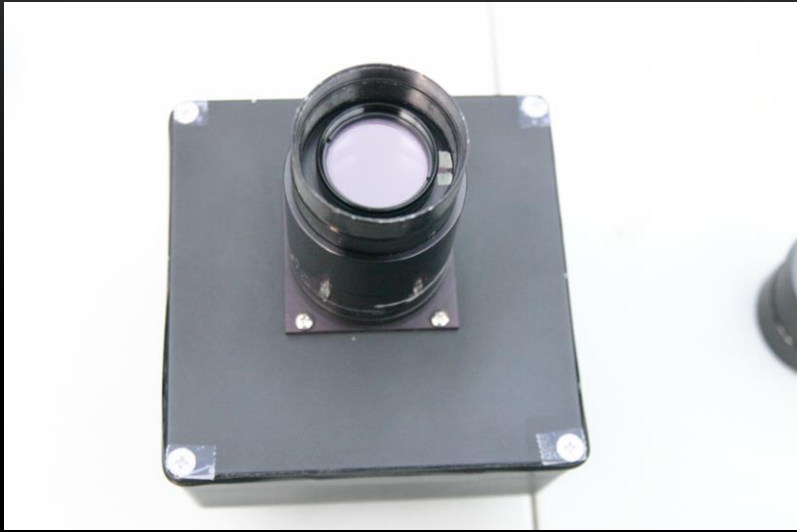
Eq.Width:

Area under curve: []

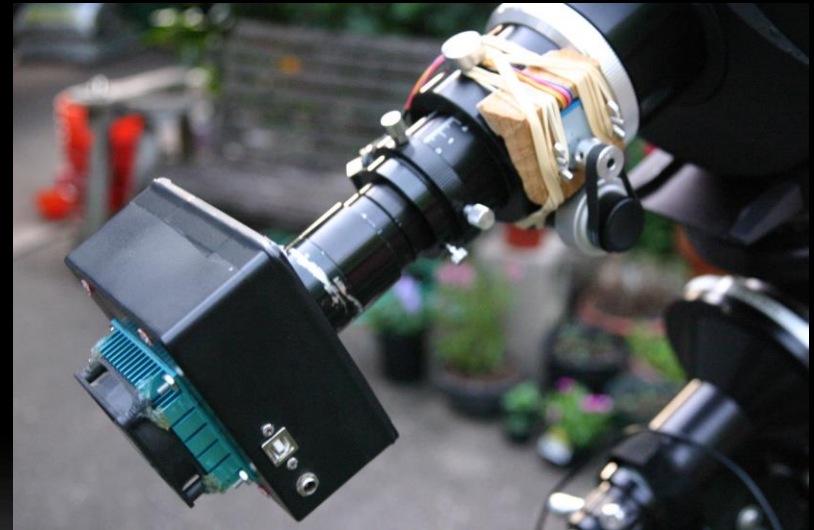
Controls

- Auto-Scale Y-Axis
- Use second X-Axis
- Use second Y-Axis
- Average - 5
- Show Focus Tool
- Logarithmic Y-axis
- Synthesize

SA100 Diffraction Grating on Monochrome CCD Camera



SECOND
ATTEMPT



Input

1. Telescope Aperture	<input type="text" value="203"/>	<input type="text" value="mm"/>
2. Telescope Focal Ratio	<input type="text" value="8"/>	<input type="text" value="f"/>
3. Seeing	<input type="text" value="3"/>	<input type="text" value="arcsec"/>
4. Grating	<input checked="" type="radio"/> Star Analyser 100 <input type="radio"/> Star Analyser 200	
5. Grating to Sensor Distance	<input type="text" value="73"/>	<input type="text" value="mm"/>
6. Camera Pixel Size	<input type="text" value="5.4"/>	<input type="text" value="um"/>
7. Camera Width	<input type="text" value="3326"/>	<input type="text" value="pixels"/>

Ok

For additional help on these 3 fields, please see: [link](#)

Want some help? The calculator can be a little overwhelming when you first see it. We can help! Send Tom your equipment list and he'll plug it into the calculator, sending you a free report that recommends the best configuration for you to use. Click on this [link](#) to get started. Why not?!

Output

8. Telescope Focal Length	<input type="text" value="1,624"/>	<input type="text" value="mm"/>
9. Star Image Size	<input type="text" value="4.4"/>	<input type="text" value="pixels FWHM"/>
10. Dispersion	<input type="text" value="7.4"/>	<input type="text" value="Angstroms/pixel"/>
11. Spectrum Coverage, 0 to	<input type="text" value="24,603"/>	<input type="text" value="Angstroms"/>

Ok

Ok

Reset



Zoom

1305

▲ ▼

Move both

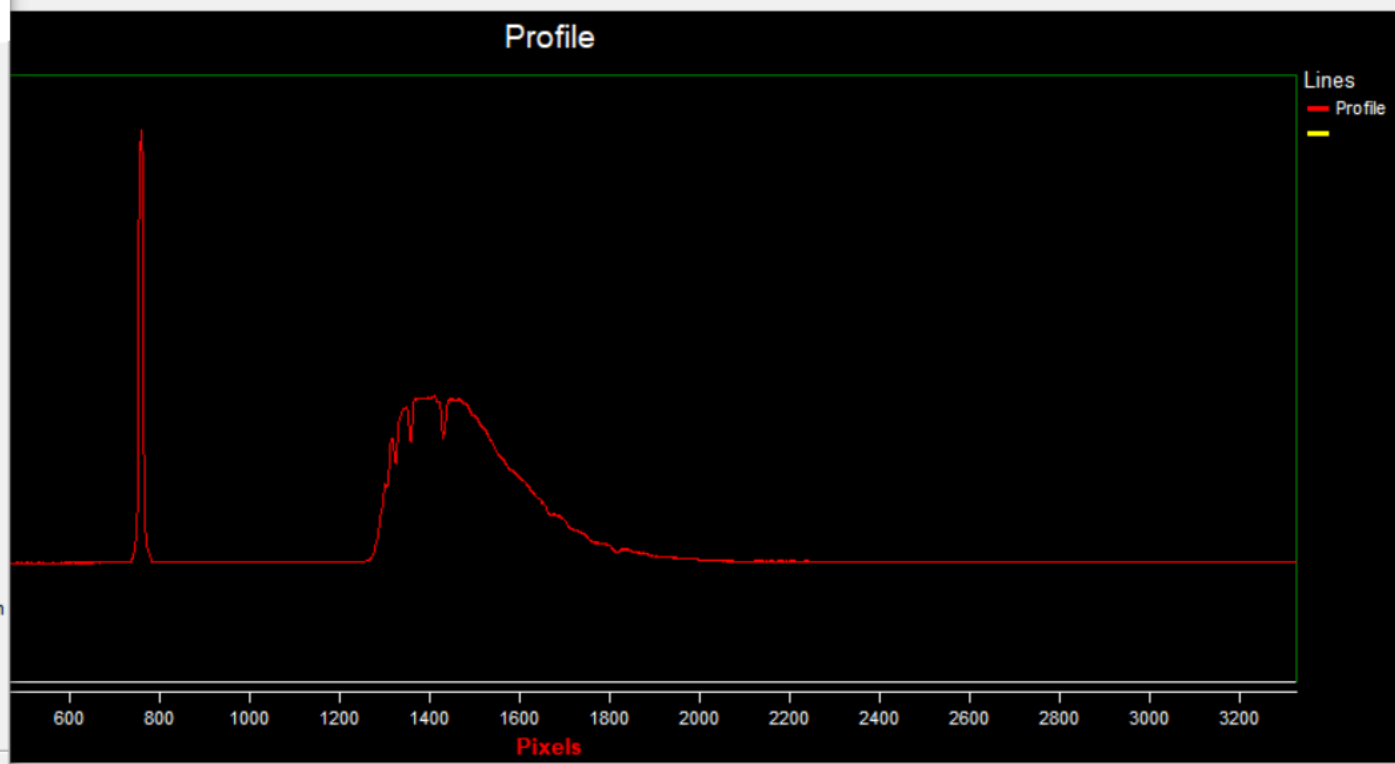
1333

▲ ▼

Move bottom

Reset

To Zoom: Position your mouse cursor on the spot in the image to which you want to zoom. Then either use your mouse roller-wheel or use the + and - keys.
 To Pan side-to-side: Hold the left mouse button down and move your mouse.



Rotate - 357.0 Subtract background

Rotate

Live Camera Video File Image File

C:\Users\sdh\Documents\Matlab\Matlab Sony S backup 180 Open

Auto-Open new files

Calibrate Appearance Reference

Measure

Show Measure Lines

Re-calc

Barycenter:

Pixel:	
Angstrom:	
FWHM:	<input type="checkbox"/>
Eq. Width:	<input type="checkbox"/>
Area under curve:	

Controls

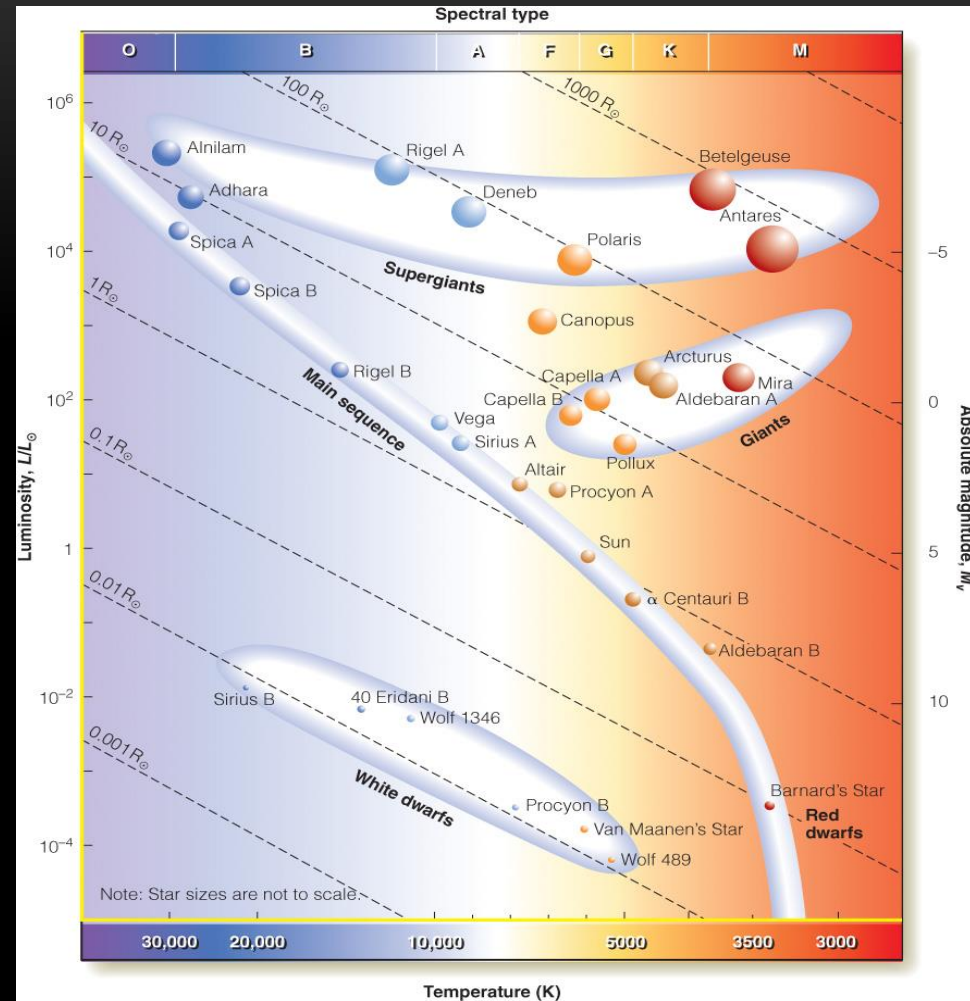
- Auto-Scale Y-Axis
- Use second X-Axis
- Use second Y-Axis
- Average - 50
- Show Focus Tool
- Logarithmic Y-axis
- Synthesize

synthesis

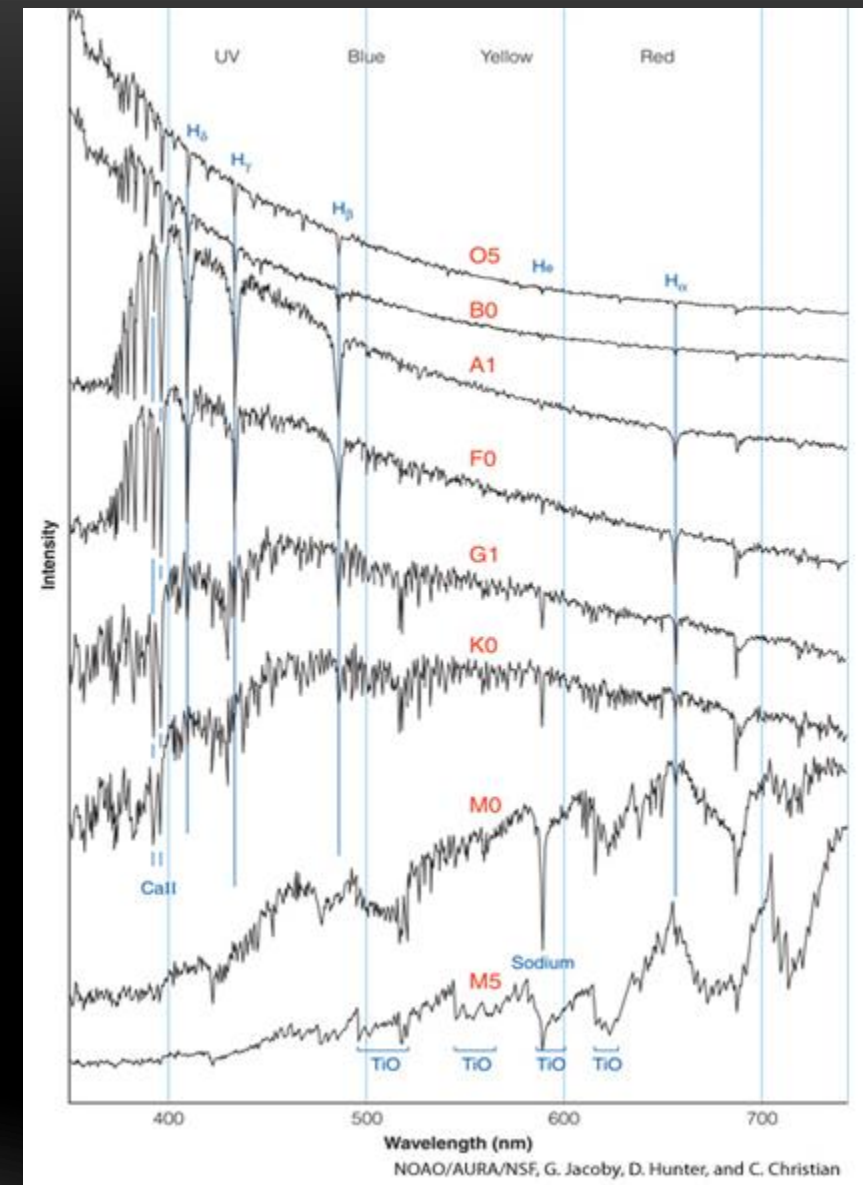


Fill

Using spectra to identify Spectral Type

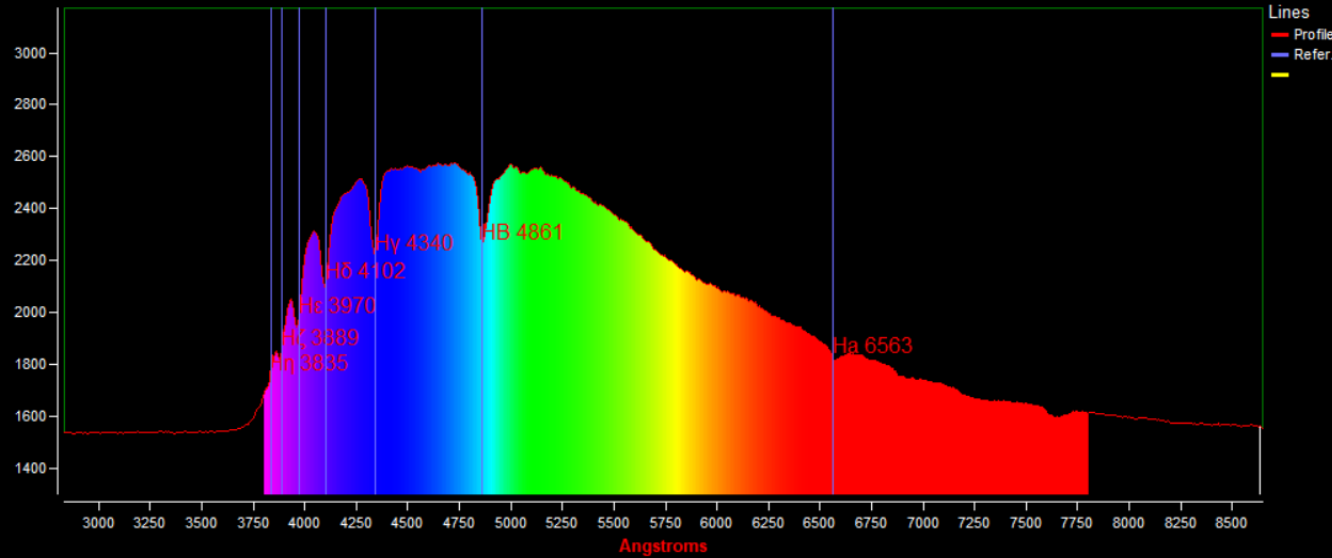


Modern digital spectra are usually represented as graphs of intensity versus wavelength, with dark absorption lines appearing as sharp dips in the curves. The hottest stars are at the top and the coolest at the bottom. **Hydrogen Balmer lines are strongest at spectral type A0**, whereas lines of ionized calcium (Ca II) are strongest in K stars. **Titanium oxide (TiO) bands are strongest in M stars.**



Angstroms/Pixel: 7.2

Phecda A0



Hydrogen Balmer lines are strongest at Spectral Type A stars

KAF-8300 Quantum Efficiency

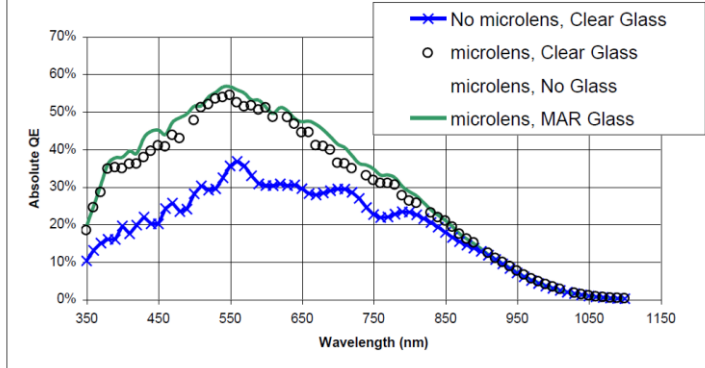
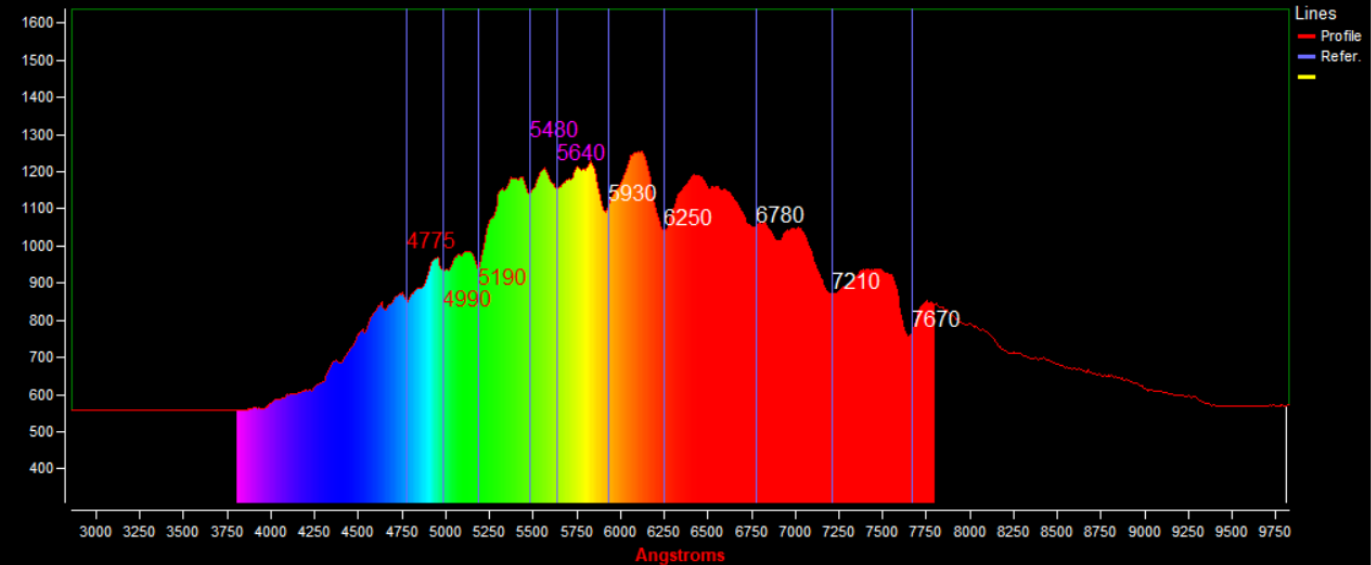


Figure 6: Typical Quantum Efficiency, all Monochrome versions

Titanium oxide (TiO) bands are strongest in Spectral Type M stars

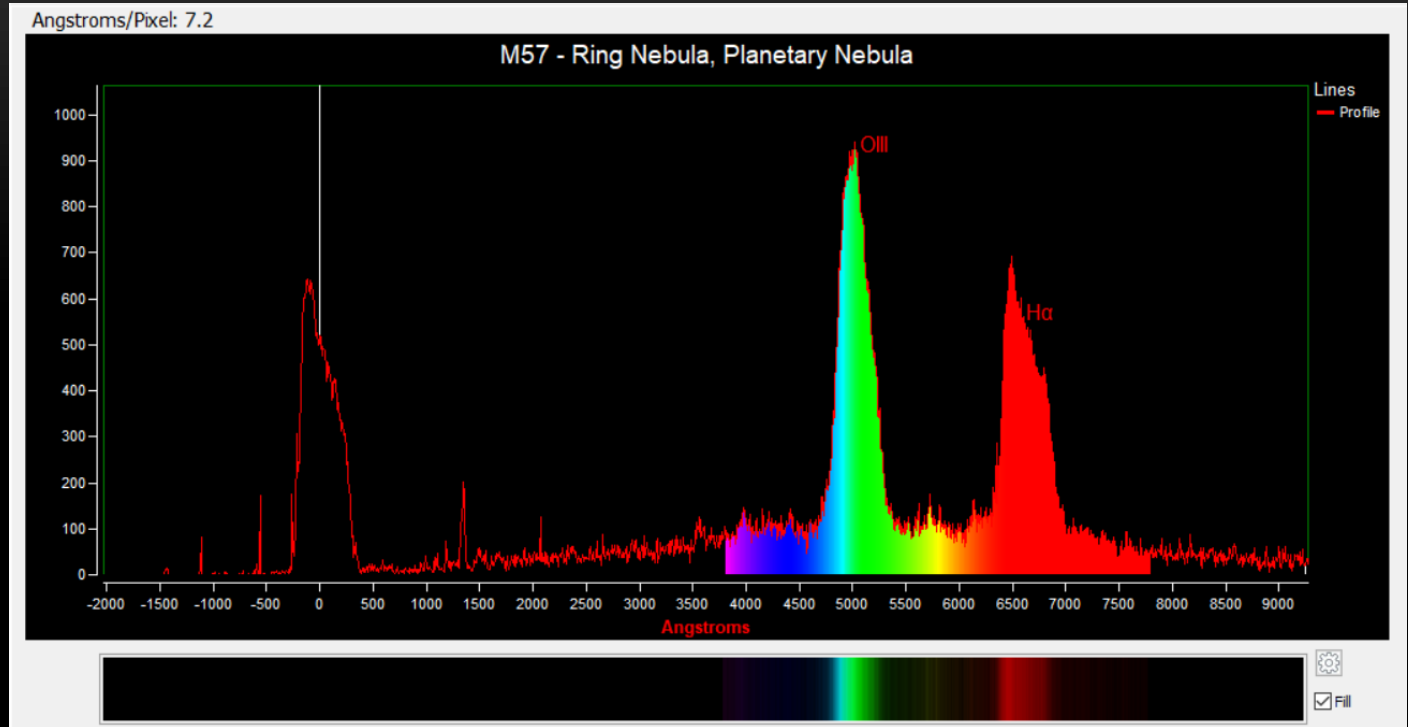
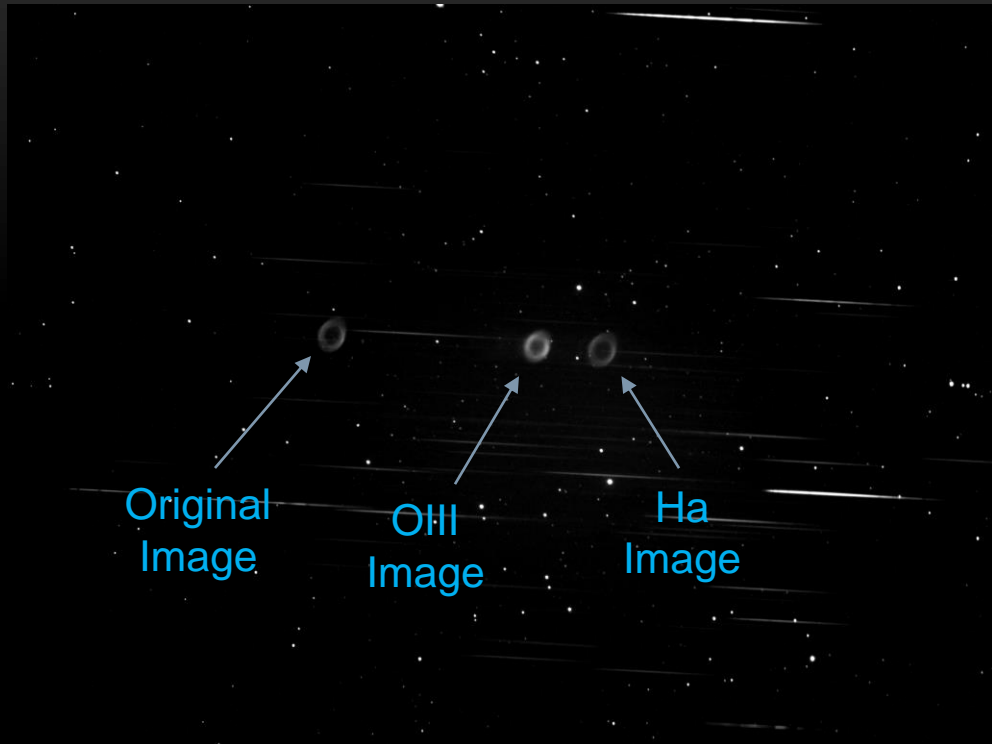
Angstroms/Pixel: 7.2

Yed Prior M1 - Titanium Oxide (TiO)

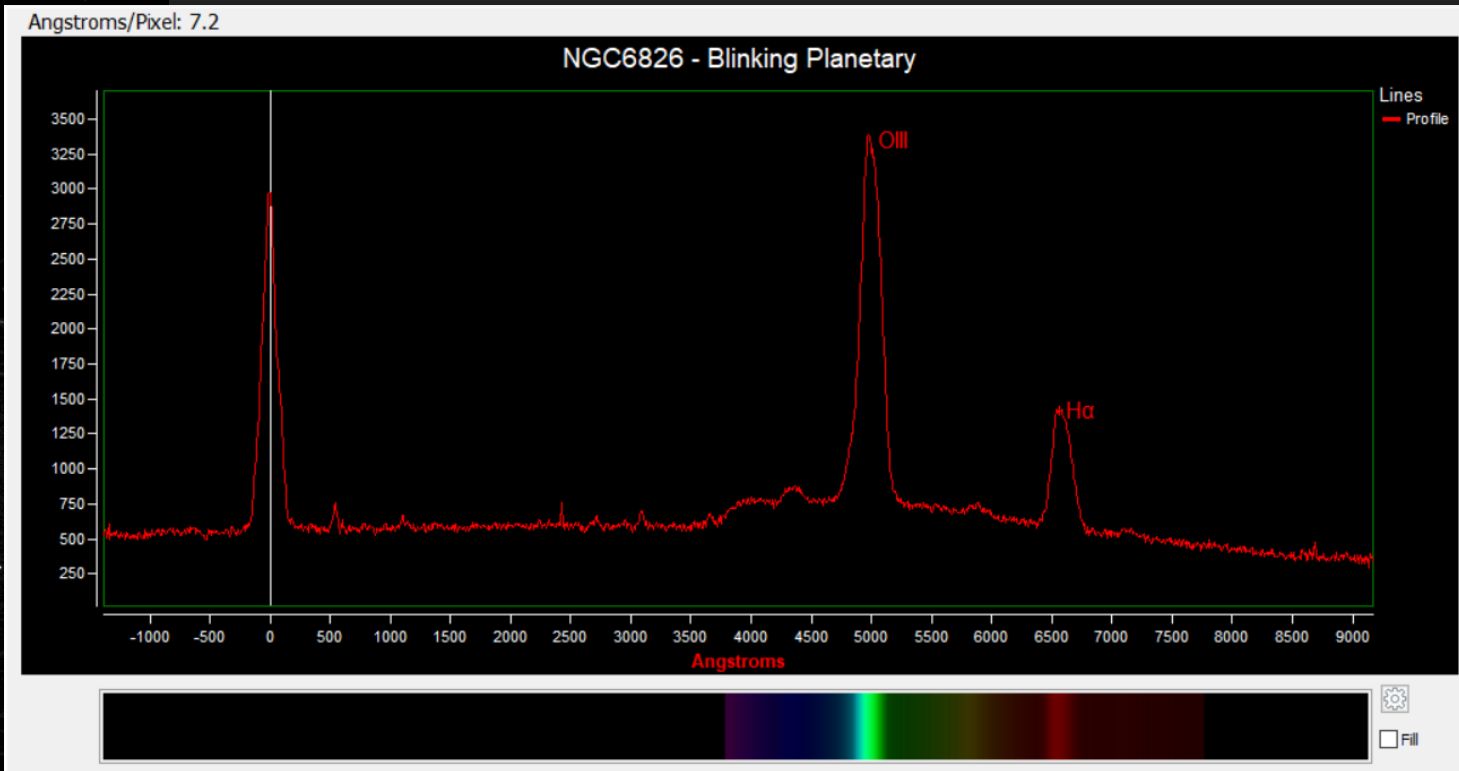
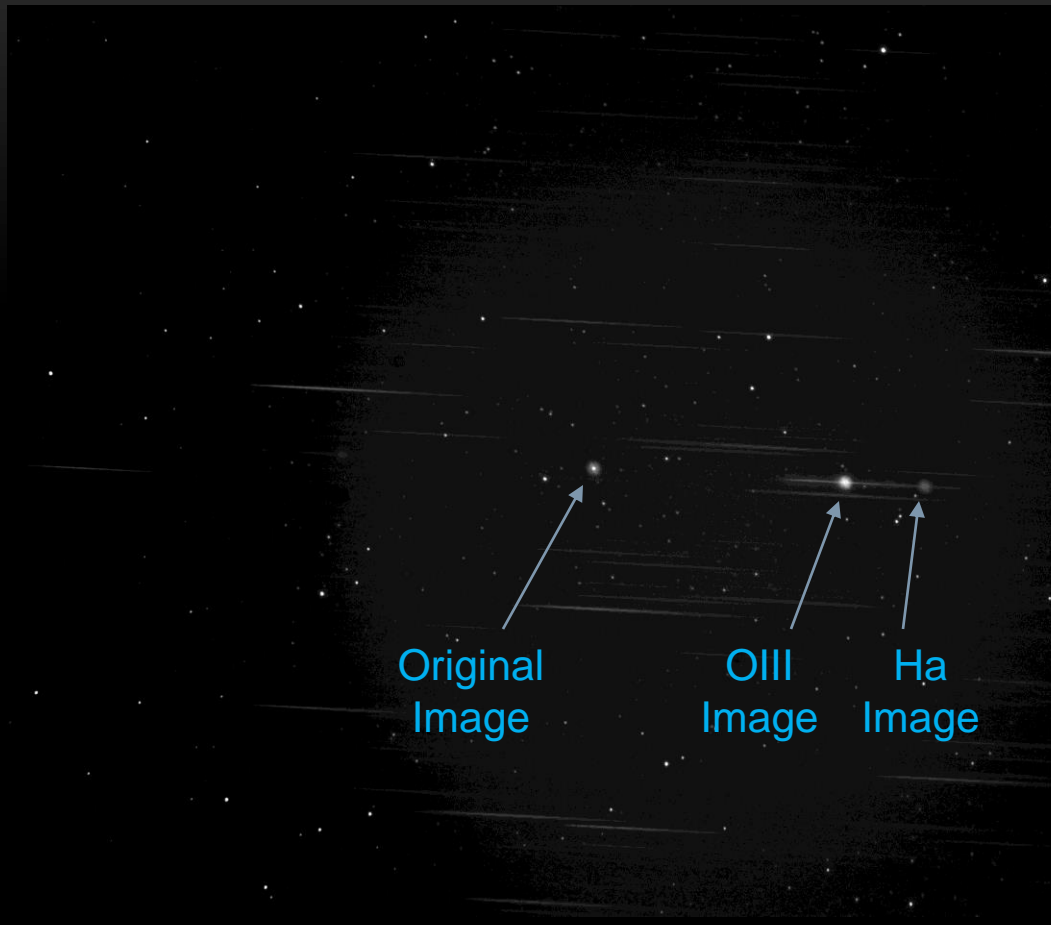


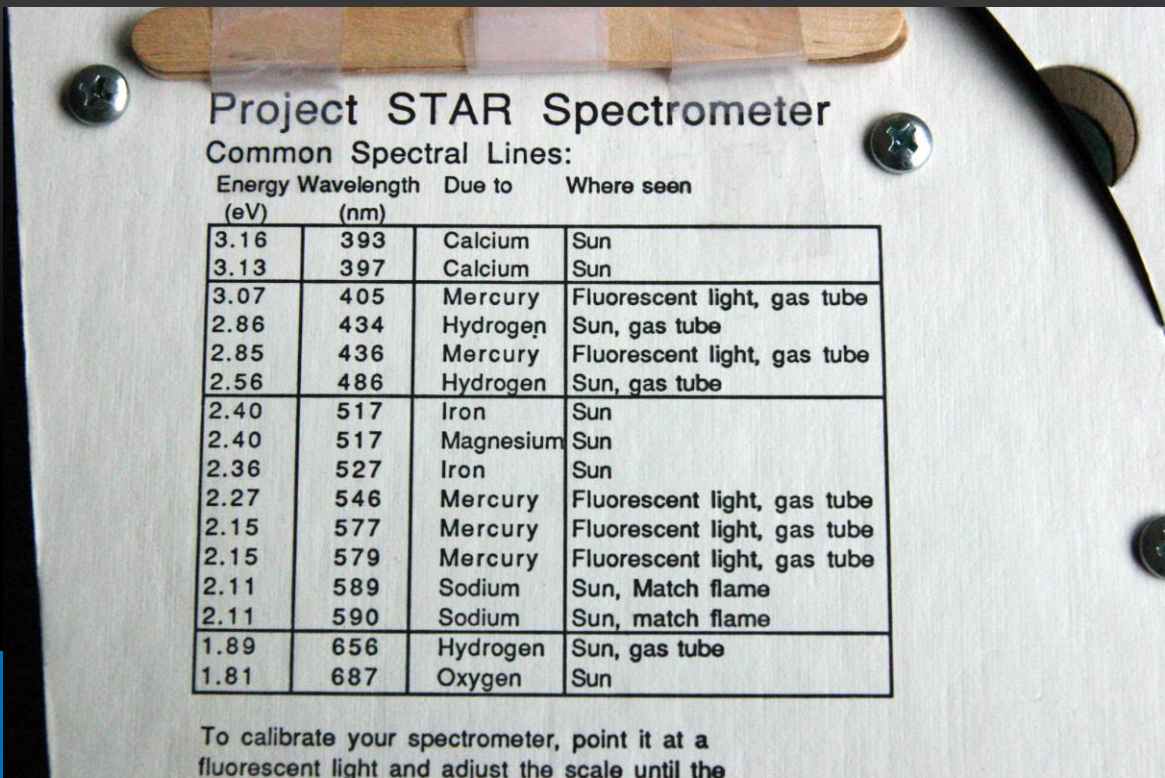
Fill

Planetary Nebula – M57: Ring Nebula



Planetary Nebula – NGC6826: Blinking Planetary





Project STAR Spectrometer

Item # P2-7055

★★★★☆ 1 Review

\$36.00

Explore flame spectra, streetlights and solar spectra with this dependable device. Since it is labeled in electron volts and nanometers, you can use it in both your physics and chemistry labs.

IN STOCK

Buy 30 and pay \$32.40 each!

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Works well for viewing absorption lines in Sun spectrum

The End