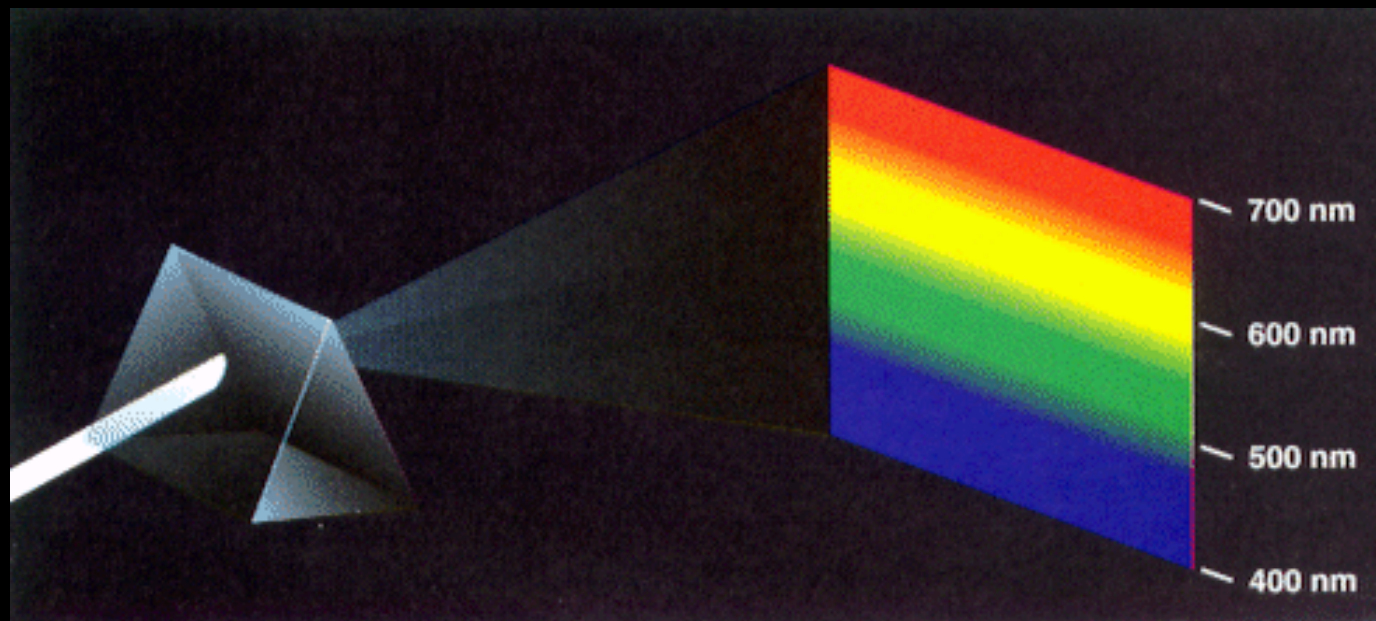


AMATEUR SPECTROSCOPY



Percy Jacobs
ASSA Pretoria Centre
ASSA Symposium
2018

The Agenda

- Equipment
- Taking the spectra
- Processing the spectra – software
- ETA Carinae Homunculus Nebula expansion speed
- References & support

Equipment

Rainbow Optics Transmission Grating (200l/mm)



So, to get a resolution of $R \sim 600$ (10 \AA°), we need to use a “slit” spectroscope.

Cheapest one on the market, is the Alpy 600 @ $\sim R24,000$

Alpy 600

Spectroscope wide range
PF0035



732.00 € incl VAT

Alpy guiding module

Compulsory on the telescope
PF0036



828.00 € incl VAT

Next cheapest on the market, the DADOS, @ ~R30,000



BAADER
DADOS
SPALT-SPEKTROGRAF

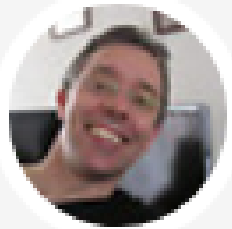
DADOS Slit – Spectrograph

2458550

€ 1,845.00

So, to get a resolution of $R \sim 900$ or $1,500$ (5 to 1 \AA°), you can build your own “slit” spectroscope for about R10,000 or as low as R5,000. Very similar to the DADOS design

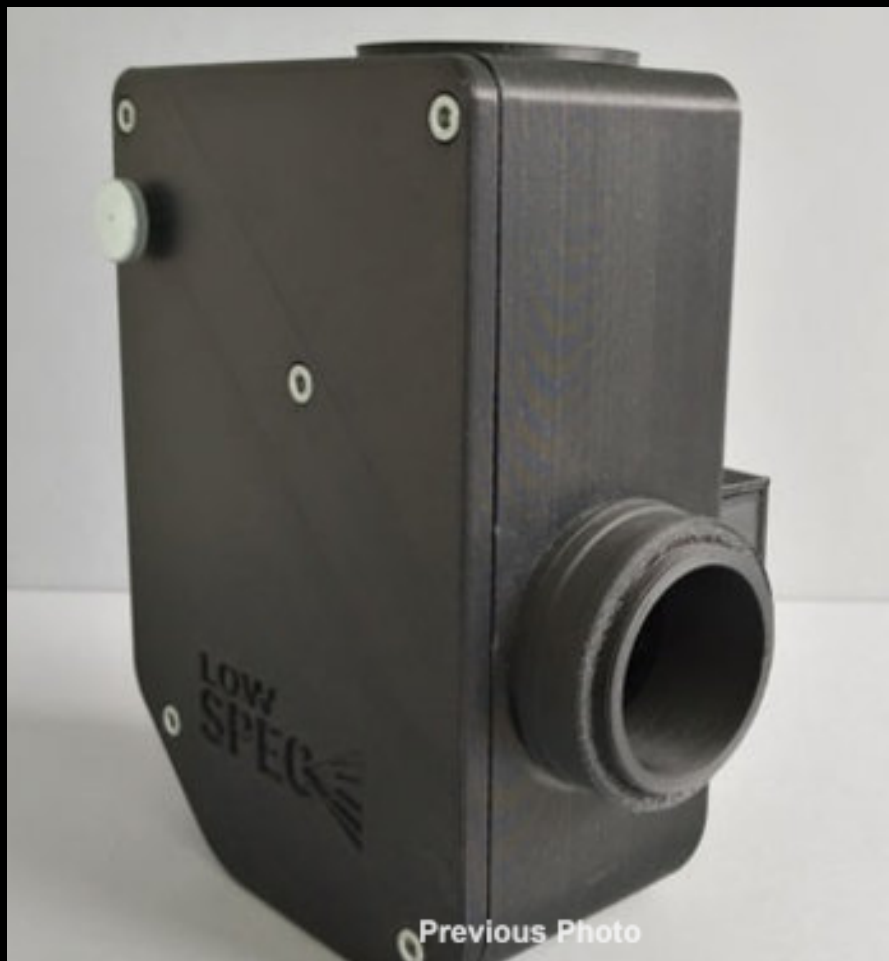
Compliments of



Spectrograph / Spectroscope (LOWSPEC)

by PJH Gerlach, published Jul 27, 2017

<https://www.thingiverse.com/thing:2455390>



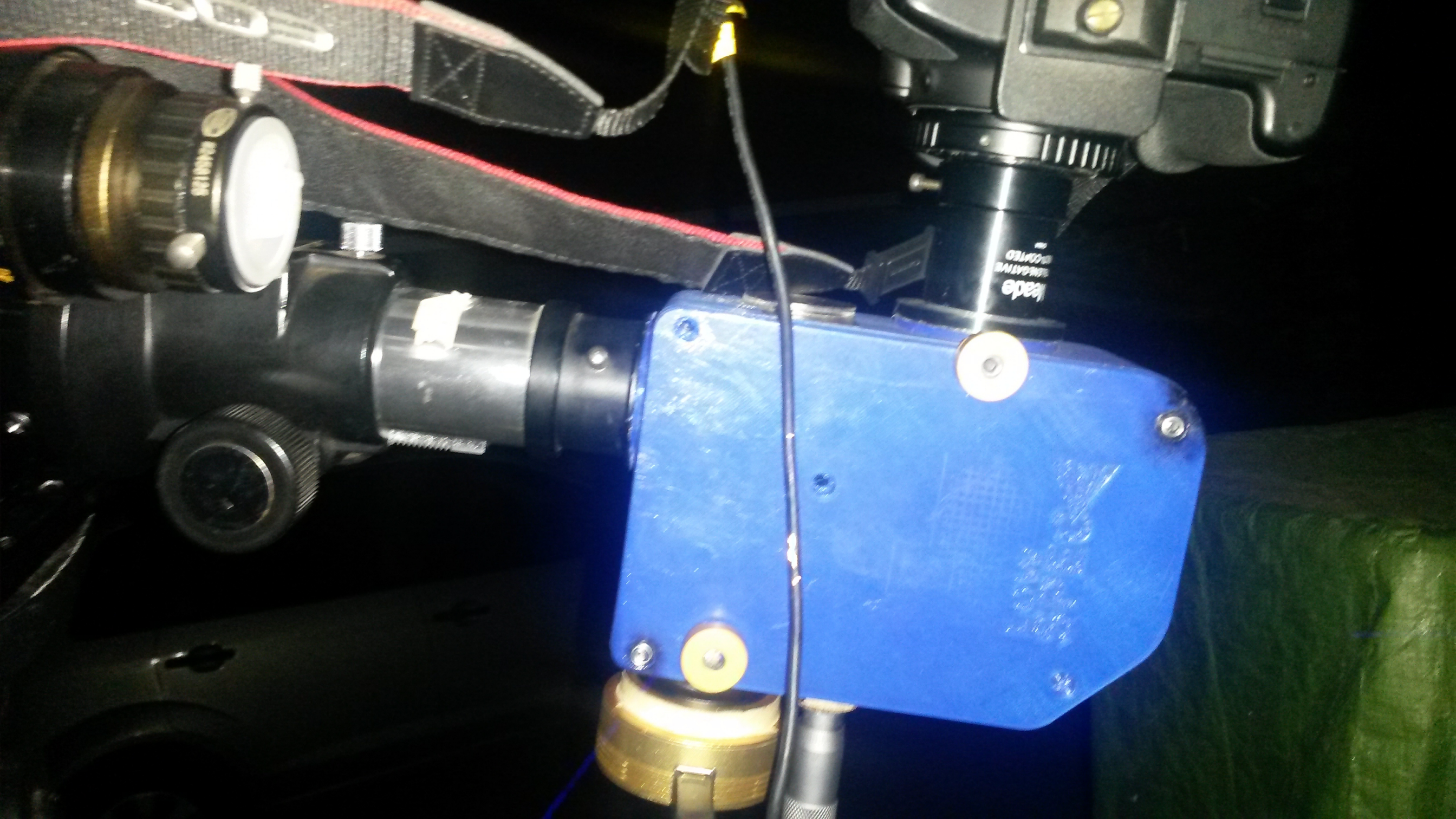
Previous Photo



Quick Upload

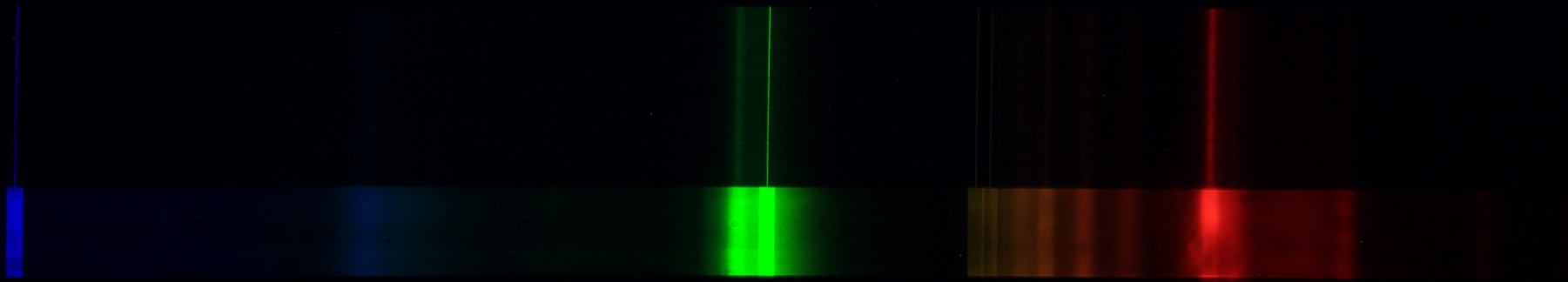
Costs

1. 3D Printing
2. Mirrors, lenses, grating
3. Slit
4. Hardware – screws, bolts, etc
5. Courier costs
6. Vat on import



Taking the spectra

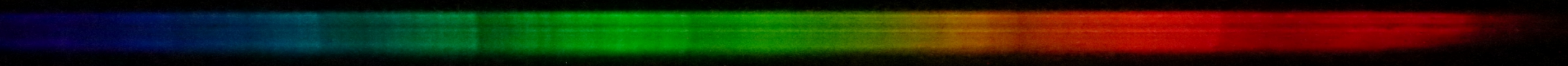
Std light spectrum - ESL Osram Sunlux reference spec



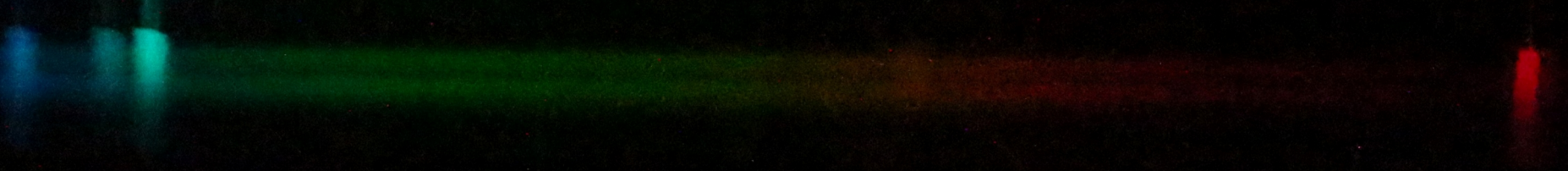
Canopus – A9 – typical std reference star



Betelgeuse – M1/M2



One of the Orion Trapezium stars



Eta Carinae



Processing the spectra Software

BASS Project Software

Basic Astronomical Spectroscopy

Secure | <https://uk.groups.yahoo.com/neo/groups/astrobodger/conversations/messages>

Apps South Africa News | News Best of 70s Rock - Great Your Guide to Labour L Clear Outside v1.0 - Int RSpec / Real-time Spec Watch Movies Online F RSpec - Real Time Spec Watch Reign - Season

Home Mail News Sport Finance Celebrity Style Weather Answers Flickr Mobile More

YAHOO! GROUPS UK & IRELAND

Search Conversations Search Groups Search web Percy Mail

Groups Home RSpec_Real_Tim... astrobodger All My Groups Manage My Groups Create a Group Browse Groups Terms Privacy Guidelines Feedback Help Blog

Basic Astronomical Spectroscopy Software

Restricted Group, 450 members

Conversations Photos Files More Membership

Topics Messages Message # Actions New Topic

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John Paraskeva • Dec 29, 2017 • #2078

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Trending Topics

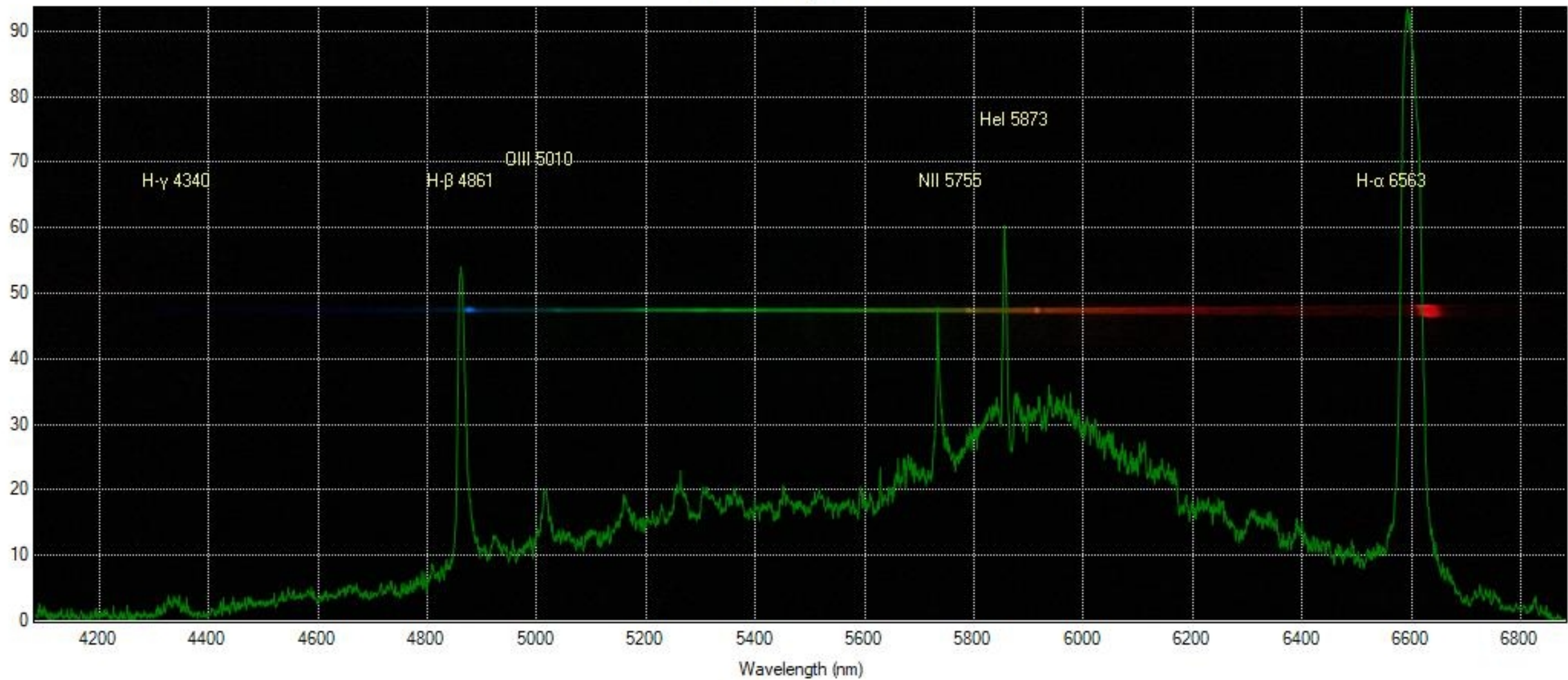
See All >

Sharpening low res spectra?	9 Posts
Re: Seasons Greetings and a new...	10 Posts
BASS Project 1.9.8 beta 3	6 Posts
Equivalent width of emission lines	13 Posts
ALPY crab	7 Posts

BASS PROJECT SOFTWARE

ETA Carinae

03.03.2018 Percy Jacobs



BASS Project 1.9.9 Beta 03 64bit

RSpec Software

The screenshot shows a web browser window displaying a Yahoo! Groups page. The browser's address bar shows the URL: https://groups.yahoo.com/neo/groups/RSpec_Real_Time_Spectroscopy/conversations/messages. The page features a navigation bar with various Yahoo! services and a search bar. The main content area displays a list of messages, with the first two visible. The first message is titled "Re: Cool Target Sugge..." and is from Robin Leadbeater, dated Dec 29, 2017. The second message is also titled "Re: Cool Target Sugge..." and is from Robin Leadbeater, dated Dec 29, 2017. A sidebar on the right shows "Trending Topics" with a list of topics and their post counts.

Y RSpec - Real Time Spectros x

Secure | https://groups.yahoo.com/neo/groups/RSpec_Real_Time_Spectroscopy/conversations/messages

Apps South Africa News | Ne Best of 70s Rock - Grea Your Guide to Labour L Clear Outside v1.0 - Int RSpec / Real-time Spec Watch Movies Online F RSpec - Real Time Spec Watch Reign - Season

Home Mail Flickr Tumblr News Sports Finance Entertainment Lifestyle Answers Groups Mobile More

YAHOO! GROUPS

Search Conversations Search Groups Search Web Percy Mail

Groups Home

RSpec_Real_Tim...

astrobodger

All My Groups

Manage My Groups

Create a Group

Browse Groups

Terms Privacy Guidelines Feedback Help Blog

RSpec - Real Time Spectroscopy

Public Group, 1045 members

Conversations Photos Files More Membership

Topics Messages Message # Actions New Topic

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Robin Leadbeater • Dec 29, 2017 • #6537

Re: Cool Target Sugge...

Hi Brad, Nice scope. Of course, always start with a nice bright A or B type star with strong Balmer absorption

Trending Topics [See All >](#)

Cool Target Suggestions?	4 Posts
Focusing	3 Posts
Calibration questions using...	5 Posts
Help with a student's...	8 Posts
Possible microlensing event in Ta...	9 Posts

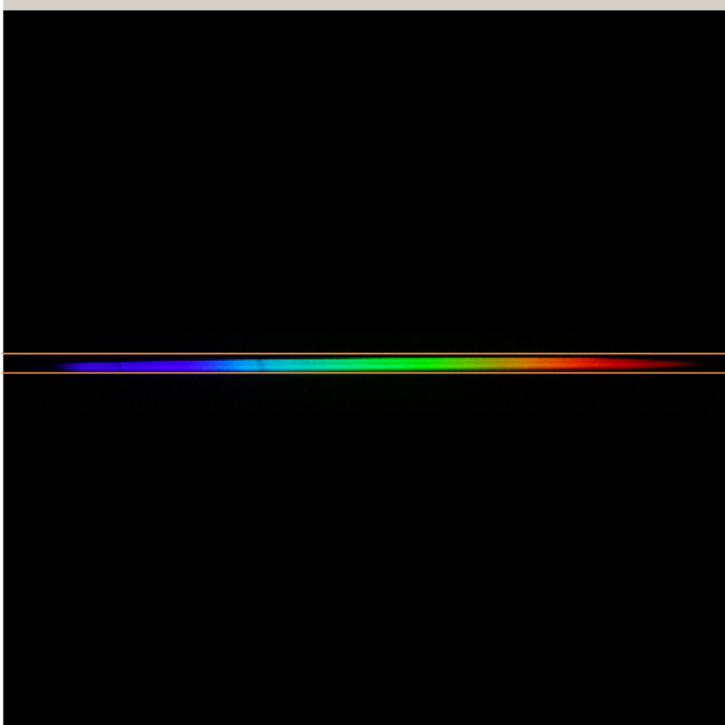
AdChoices

Kickstart your

RESPEC

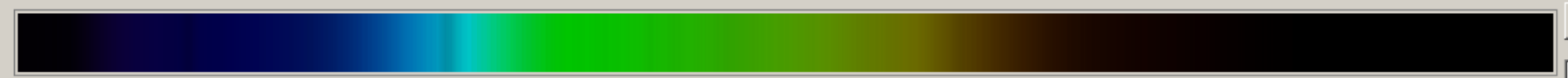
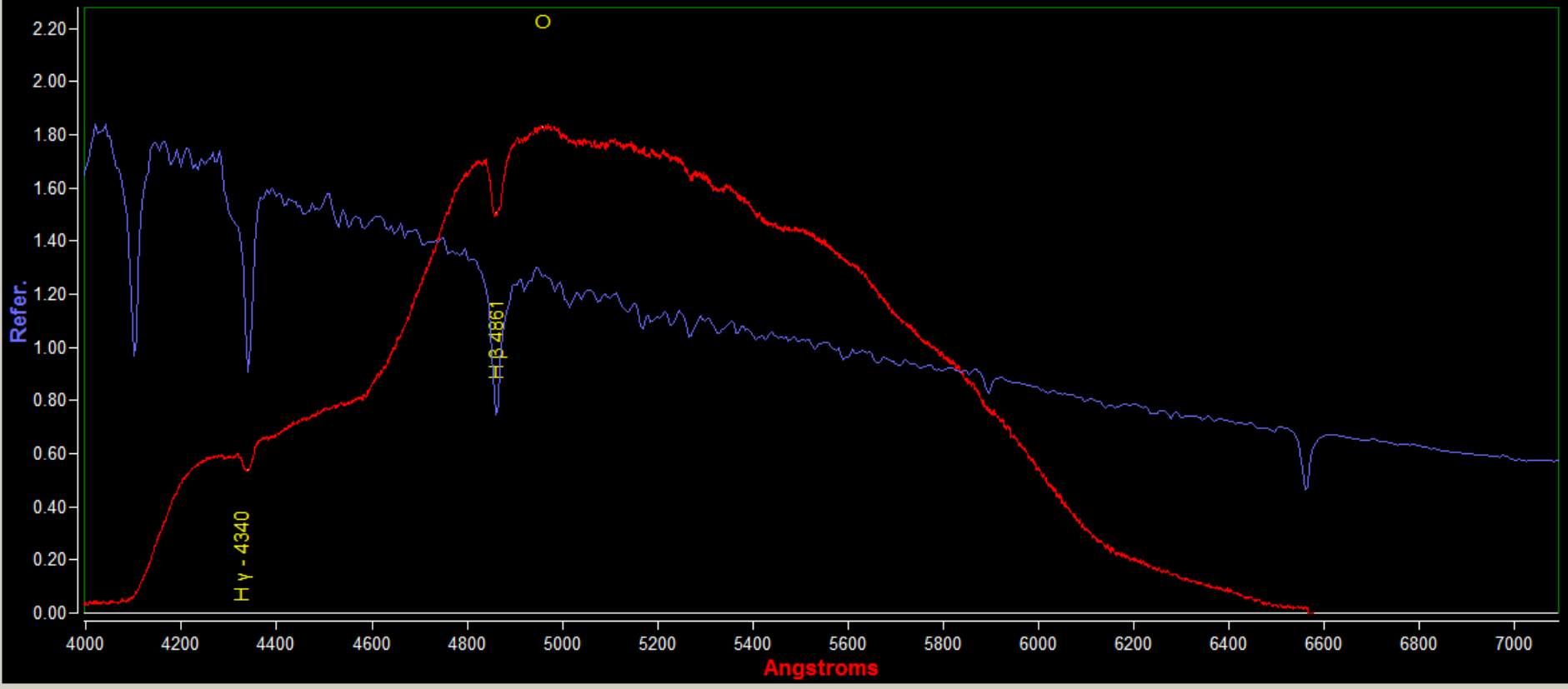
RSpec - C:\Users\p\Documents\Percy\RSpec\My Spectra\experi 03.01.2018\Canopus 4.JPG

File Edit View Tools Help



Angstroms/Pixel: 0.5

Canopus 4.JPG



Rotate Subtract background

Live Camera | Video File | Image File

C:\Users\p\Documents\Percy\RSpec\ Auto-Open new files

Measure

Show Measure Lines

Pixel:	<input type="text"/>
Angstrom:	<input type="text"/>
FWHM:	<input type="checkbox"/>
Eq.Width:	<input type="checkbox"/>

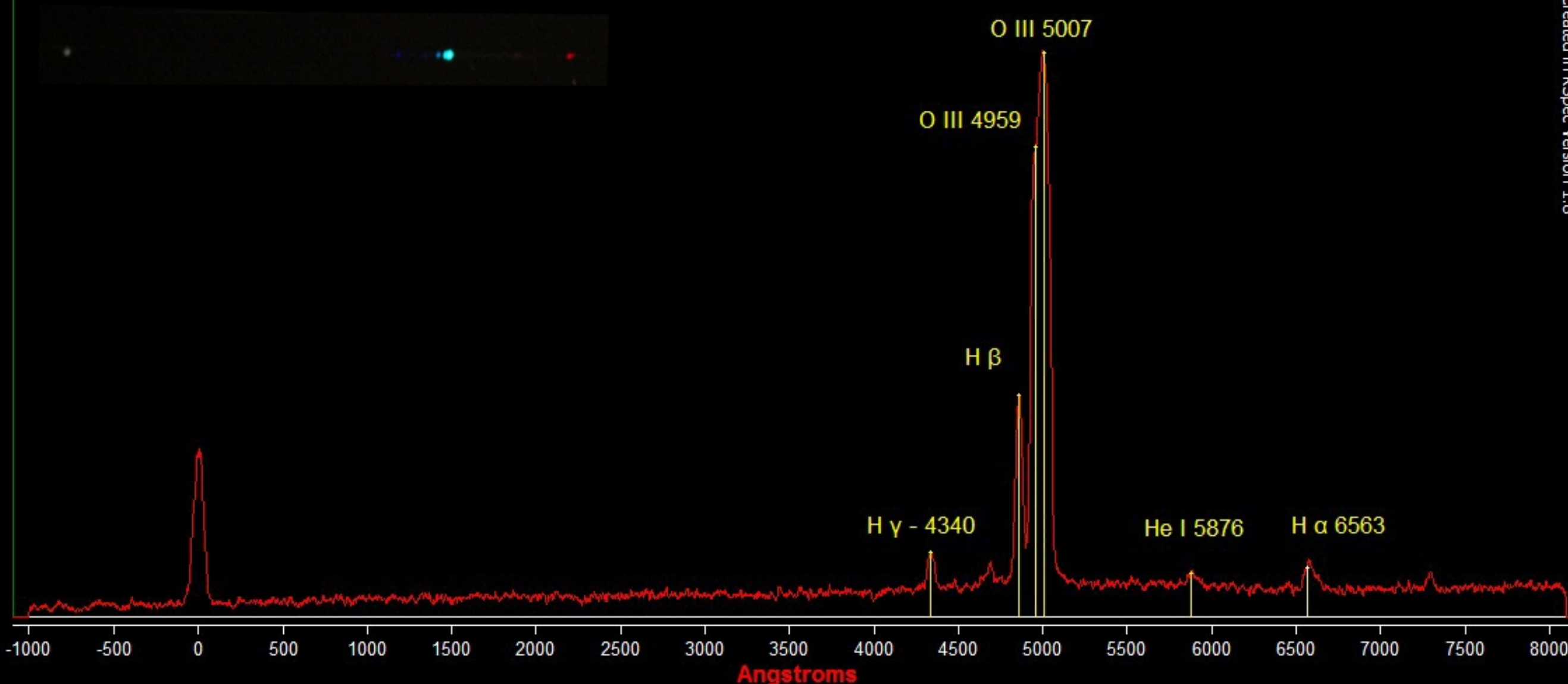
Controls

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

DSC_0005 Saturn Neg ngc 7009.jpg

Percy Jacobs

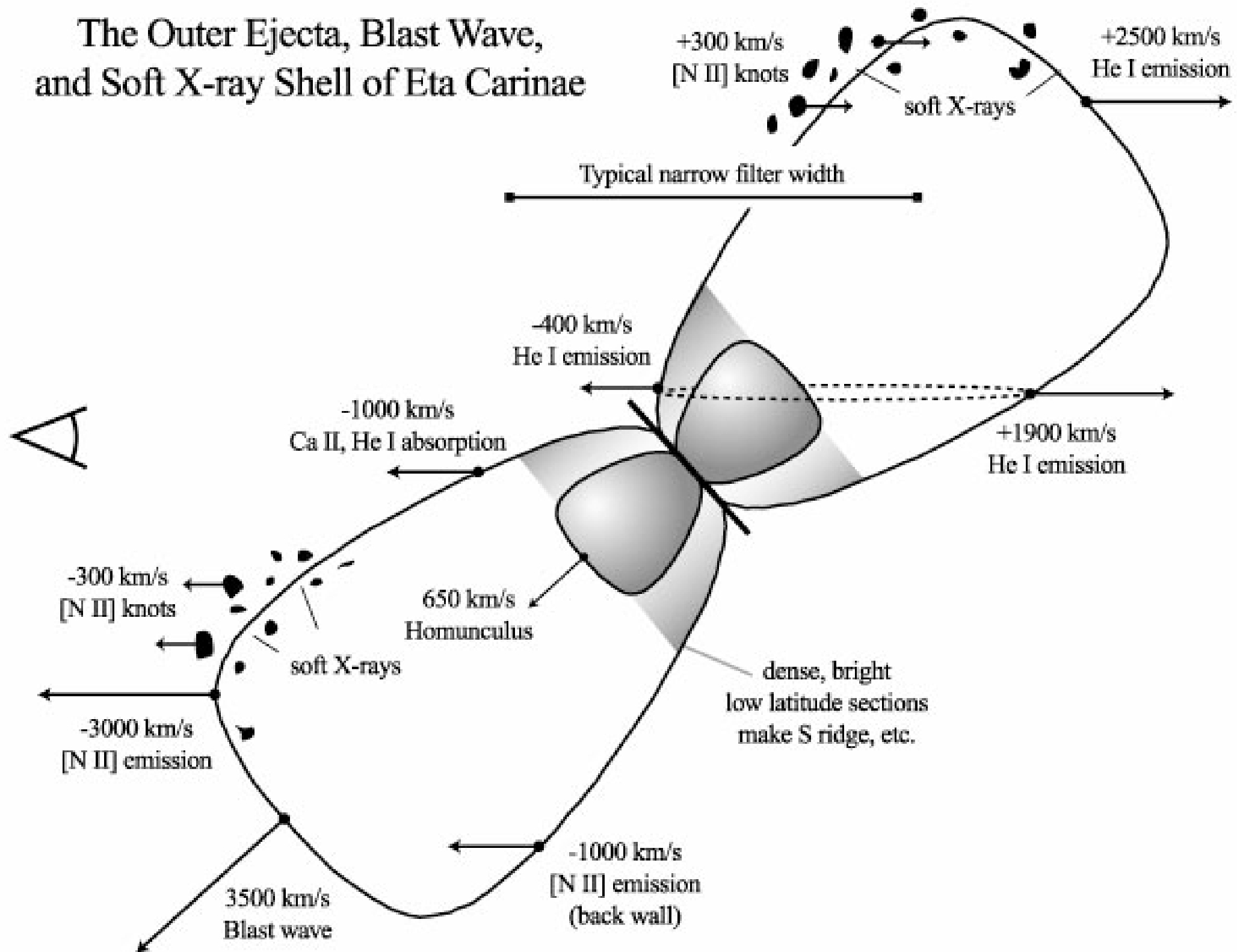
Created in RSpec Version 1.8



**ETA Carinae
Homunculus Nebula
expansion speed
measurement**

The Homunculus Nebula surrounding Eta Carinae

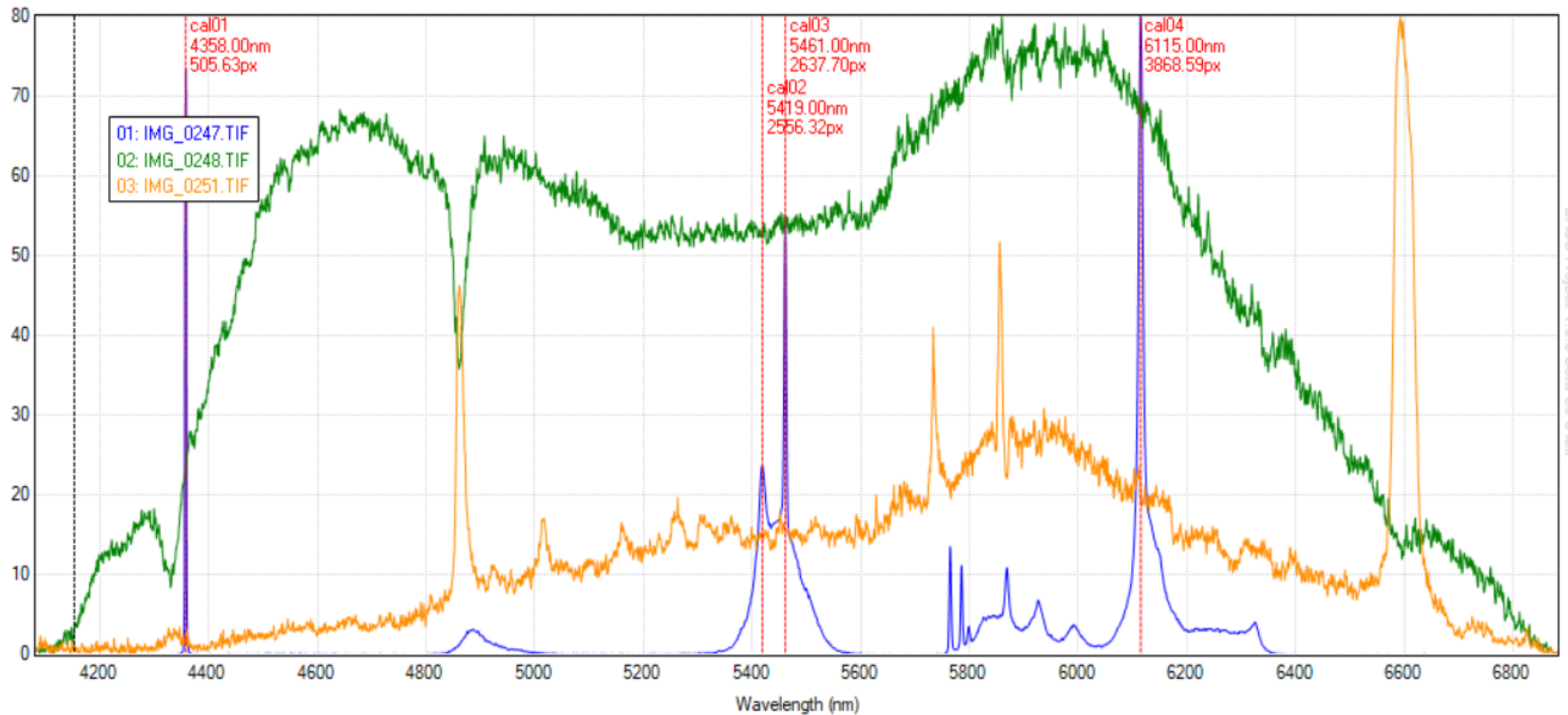
The Outer Ejecta, Blast Wave, and Soft X-ray Shell of Eta Carinae



**No expansion speed seen in the ETA Carinae “homunculus” nebula
Calibrated vs std star - H-γ 4340 Å & H-β 4861 Å
Note that I did not focus on the H-α line!**

03

03



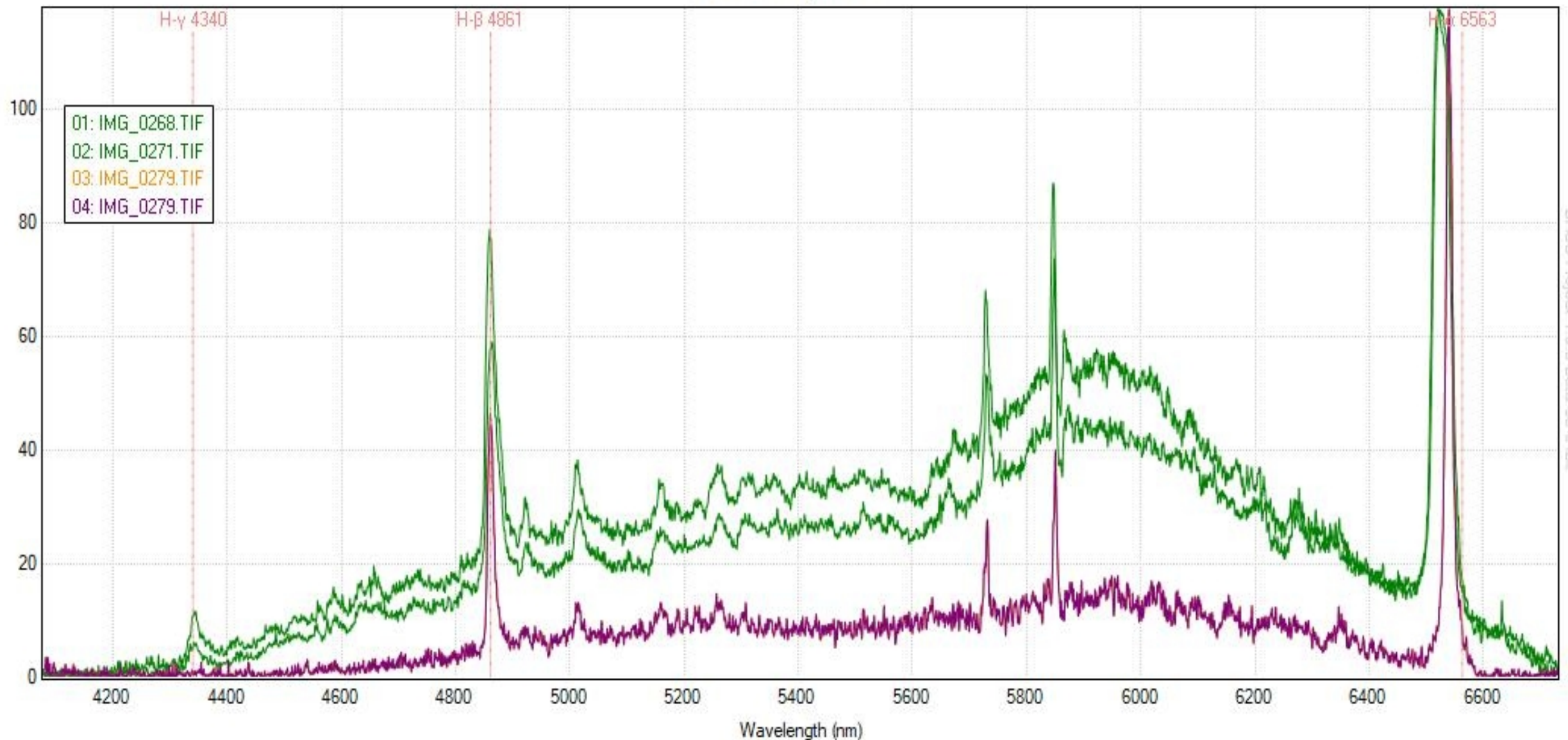
BASS Project 1.9.8 Beta 03 64bit

Now, vs std star, 2 calibration points, H- γ & H- β , note the expansion seen on the H- α line!

**Difference – approx. 30 Å to 40 Å
Therefore, expansion speed of approx. 1,500km/s**

ETA Carinae calibrated vs std star - shift seen in H Alpha Line

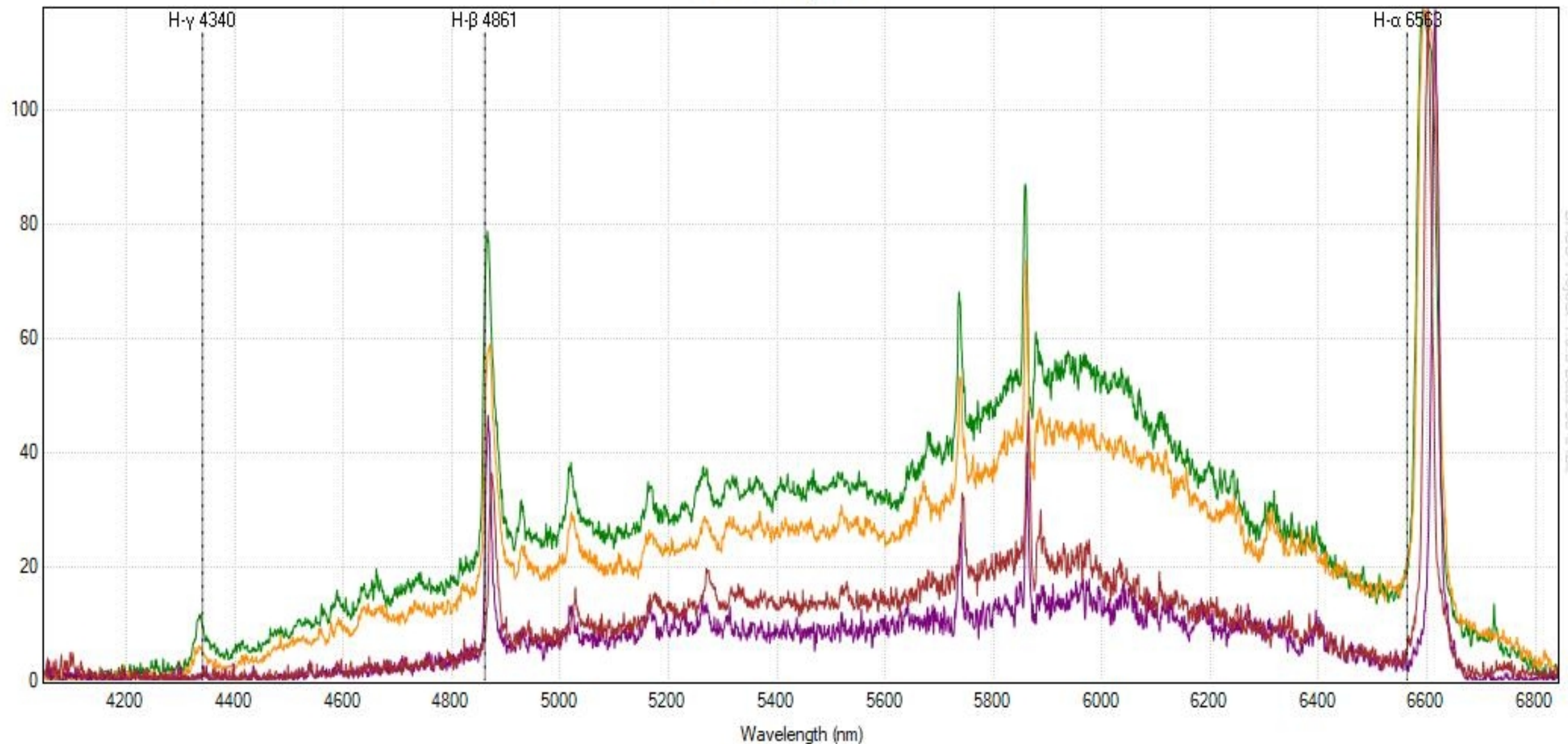
08.03.2018 Percy Jacobs



**Then, vs std lamp, 4 calibration points, H γ 4358 Å to Ar 6115 Å, note the expansion seen on the H- α line!
Difference – approx. 30 Å to 40 Å
Therefore, expansion speed of approx. 1,500km/s**

ETA Carinar vs lamp calibration

08.03.2018 Percy Jacobs



References & Support

Spectroscopic Atlas for Amateur Astronomers

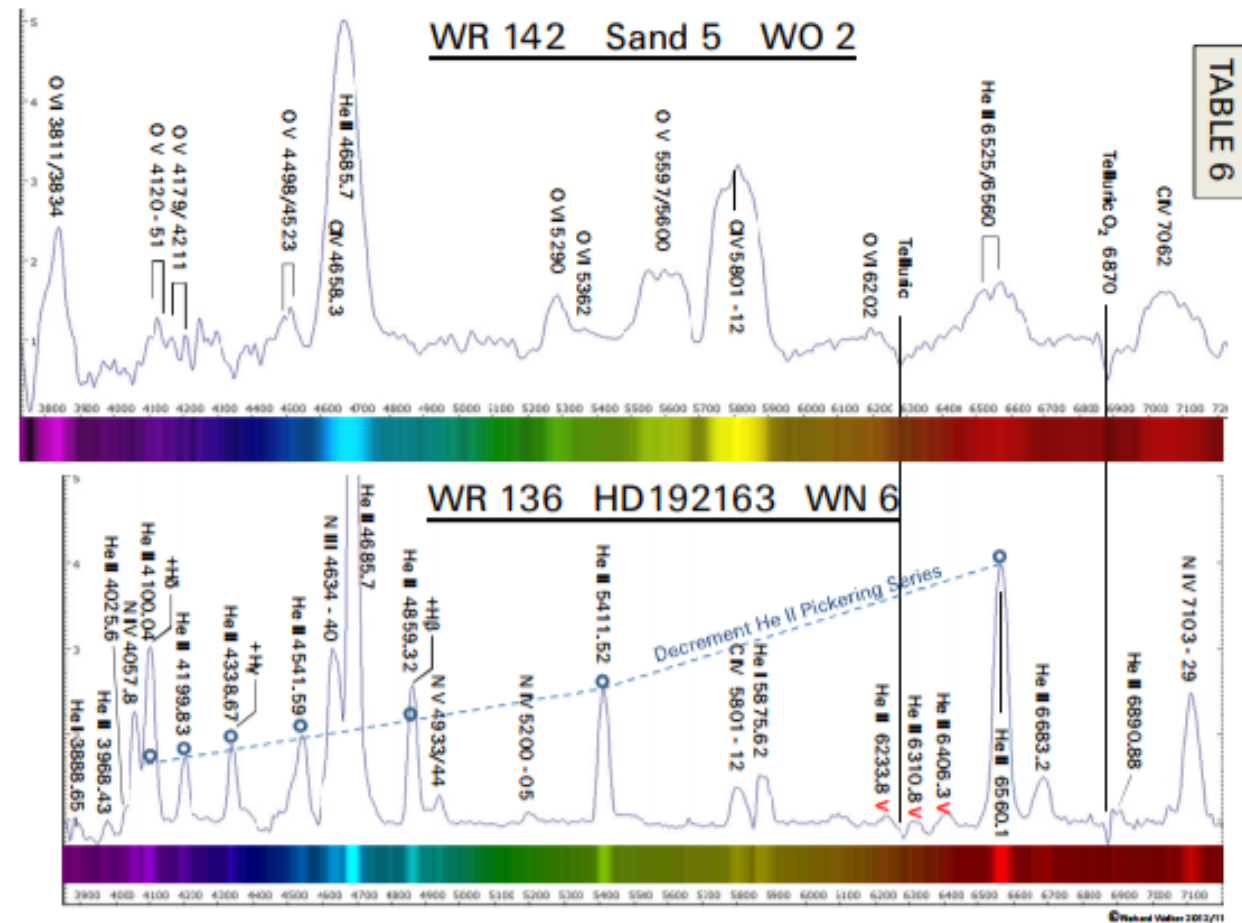
A Spectroscopic Guide
to Astronomical Objects
and Terrestrial Light Sources

Richard Walker

Version 5.0

04/2014

218 page reference and explanation doc



Books

Spectroscopy: The Key to the Stars – Keith Robinson

Astronomical Spectroscopy for Amateurs – Ken M. Harrison

Astronomical Spectrography for Amateurs – EAS Publication Series – J.P. Rozelot, C. Neiner

Spectroscopic Atlas for Amateur Astronomers (no longer a free pdf download – now buy on-line through Cambridge University Press) - Version 5.0 04/2014 (if you send me an email, I can send you a pdf copy of Version 4)

Software

BASS Project (Basic Astronomical Spectroscopy Software by John Paraskeva -

http://www.aesesas.com/mediapool/142/1423849/data/DOCUMENTOS/BASS_Project_1_.pdf

Tom Field - RSpec – <http://www.rspect-astro.com>

Visual Spec – <http://www.astrosurf.com/vdesnoux>

Christian Buil - <http://www.astrosurf.com/~buil>

Individual Support

Ken M. Harrison – very specialised in amateur spectroscopy and willing to help – ex member of the Durban ASSA group – you can contact him via the above “yahoo” group or direct on kenm.Harrison@gmail.com

Robin Leadbeater - THREE HILLS OBSERVATORY - (Formerly "ROBIN'S ASTRONOMY PAGE")

<http://www.threehillsobservatory.co.uk/astro/astro.htm>

Christian Buil's Visual Spec software page & home page

Download
Version 4.2.6

Visual Spec

Processing
User's manuals & quick ref
Tutorials - NEW

Spectral analysis

Theoretical spectrum
Arcturus
Measurements

Observations


ETX and grating
T60 "Pic du midi"
Spectral data
Data reduction
Cataclysmics

Resource


Spectro in French
C.Buil's web site
Bookmark - NEW
Valérie Home page

Spectroscopy is not for me !

How to process spectrum...



What does it look like ?...



Visual Spec

A universe to discover...

VISUAL SPEC IS A FREE SOFTWARE TO PROCESS ASTRONOMICAL SPECTRA...

Last update 02/01/2015

Valérie Desnoux - AUDE Association

Spectroscopy, CCD and Astronomy

Spectroscopy, CCD & Astronomy: A site dedicated to the use of electronic detectors in the field of astronomy and spectroscopy

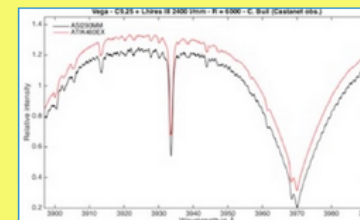
Welcome to Christian Buil home page

Home Observations Spectrographs Cameras Gallery IRIS software ISIS software Astro links Spectro links

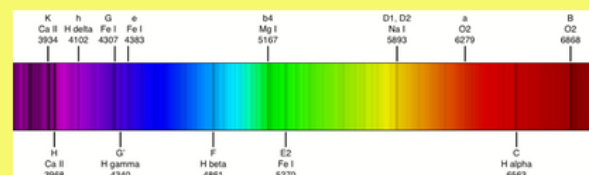
Highlight...



Atik Horizon / ASI1600MM



Compare CCD and CMOS sensors

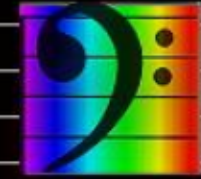


Spectroscopy overview (focus on Alpy 600)



Integrated Spectrographic Innovative Software (ISIS)
Version 5.9.2

Yahoo Spectroscopy Groups



Basic Astronomical Spectroscopy Software

🔒 Restricted Group, 479 members

A photograph of a telescope mounted on a tripod, with a spectrograph attachment. The background is a dark, cloudy sky.

Astronomical Amateur Spectroscopy / Spectroscopie Amateur en Astronomie

🔒 Restricted Group, 726 members

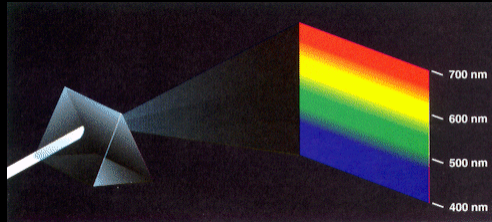
A close-up photograph of various optical components, including lenses and prisms, arranged on a surface. The image is heavily filtered with a blue color.

RSpec - Real Time Spectroscopy

🌐 Public Group, 1058 members

THANK YOU

AMATEUR SPECTROSCOPY



Percy Jacobs
ASSA Pretoria Centre
ASSA Symposium
2018

The Agenda

- Equipment
- Taking the spectra
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Cheapest one on the market, is the Alpy 600 @ ~R24,000

Alpy 600

Spectroscope wide range
PF0035



732.00 € incl VAT


Alpy guiding module

Compulsory on the telescope
PF0036



828.00 € incl VAT

Next cheapest on the market, the DADOS, @ ~R30,000



The image shows a Baader DADOS Slit Spectrograph, a white and black optical instrument. Above the device is a small inset image showing a spectrum of light with horizontal lines in blue, green, and red. The device has a large lens on the left and a smaller lens on the right, with various adjustment knobs and a handle.

BAADER
DADOS
SPALT-SPEKTROGRAF

DADOS Slit – Spectrograph

2458550

€ 1,845.00

So, to get a resolution of $R \sim 900$ or $1,500$ (5 to 1 \AA°), you can build your own "slit" spectrograph for about R10,000 or as low as R5,000. Very similar to the DADOS design

Compliments of



Spectrograph / Spectroscope (LOWSPEC)

by PJHGerlach, published Jul 27, 2017

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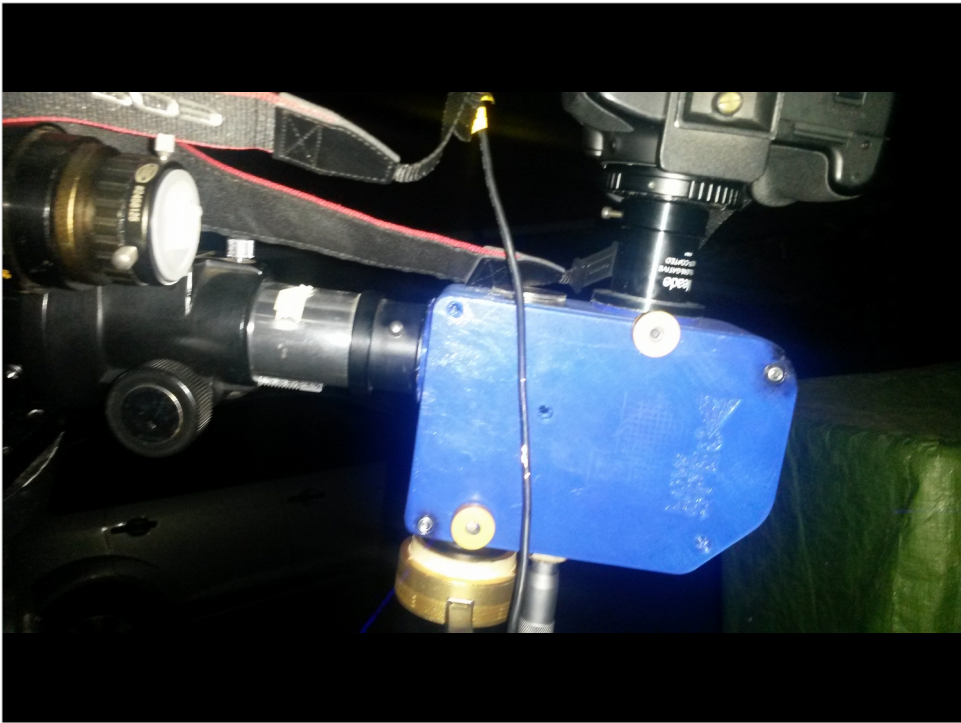
Previous Photo



Quick Upload

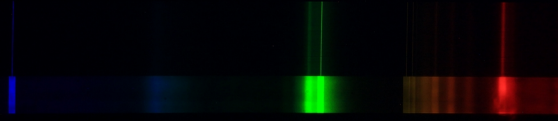
Costs

1. 3D Printing
2. Mirrors, lenses, grating
3. Slit
4. Hardware – screws, bolts, etc
5. Courier costs
6. Vat on import



Taking the spectra

Std light spectrum - ESL Osram Sunlux reference spec



Canopus – A9 – typical std reference star



Betelgeuse – M1/M2



One of the Orion Trapezium stars



Eta Carinae



Processing the spectra Software

BASS Project Software

The screenshot shows a web browser window displaying a Yahoo! Groups forum page. The browser's address bar shows the URL: <https://uk.groups.yahoo.com/neo/groups/astrobdodger/conversations/messages>. The page features a navigation menu with links for Home, Mail, News, Sport, Finance, Celebrity, Style, Weather, Answers, Flickr, Mobile, and More. The Yahoo! Groups logo is visible in the top left corner.

The forum header includes a search bar with 'Search Conversations' and buttons for 'Search Groups' and 'Search web'. The group name 'Basic Astronomical Spectroscopy Software' is prominently displayed, along with a colorful spectrum image and a profile picture of a person. Below the header, there are tabs for 'Conversations', 'Photos', and 'Files'. The 'Conversations' tab is active, showing a list of messages. The first message is titled 'Re : Sharpening low res s...' and the second is 'Re: Slightly off topic 3D print q...'. A 'Trending Topics' sidebar on the right lists several topics with their respective post counts.

Basic Astronomical Spectroscopy Software
Restricted Group, 450 members

Conversations | Photos | Files | More

Membership

Topics | Messages | Message # | Actions | New Topic

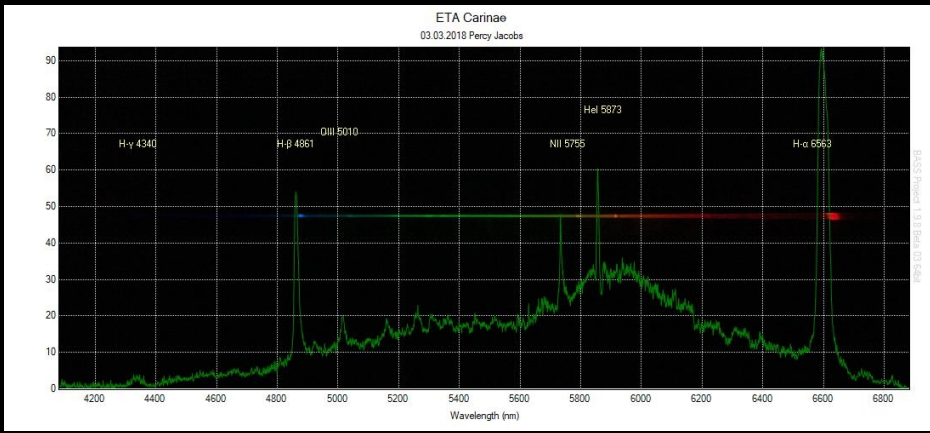
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John Paraskeva · Dec 29, 2017 · #2078

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John Paraskeva · Dec 29, 2017 · #2077

Trending Topics | See All >

- Sharpening low res spectra? 9 Posts
- Re: Seasons Greetings and a new... 10 Posts
- BASS Project 1.9.8 beta 3 6 Posts
- Equivalent width of emission lines 13 Posts
- ALPY crab 7 Posts

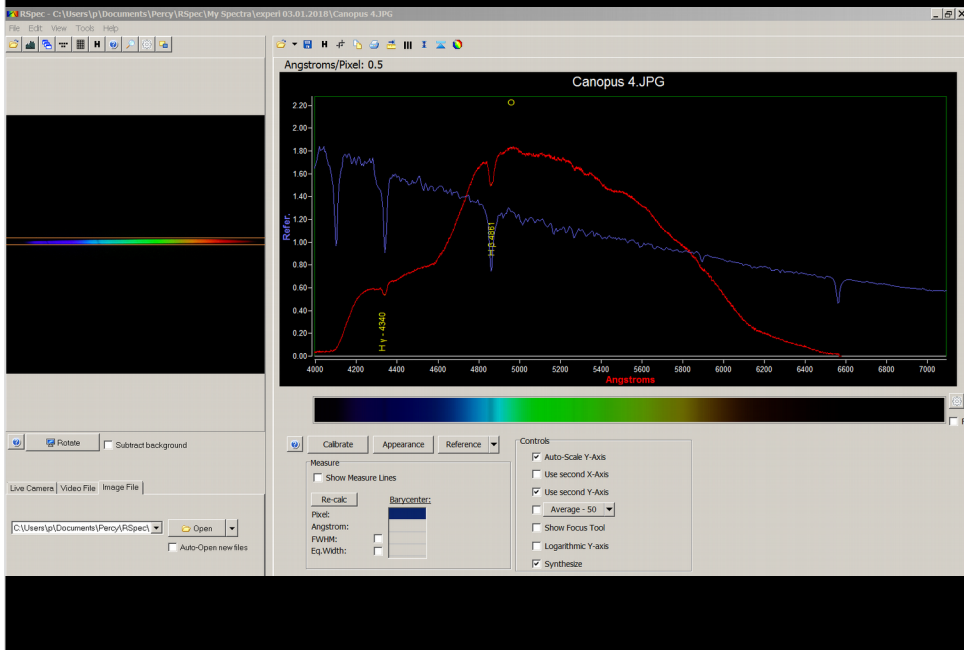
BASS PROJECT SOFTWARE



RSpec Software

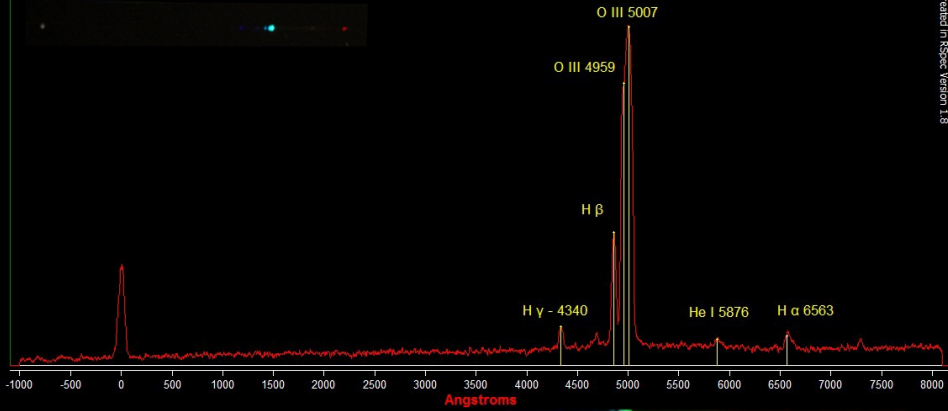
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RESPEC




DSC_0005 Saturn Neg ngc 7009.jpg

Percy Jacobs

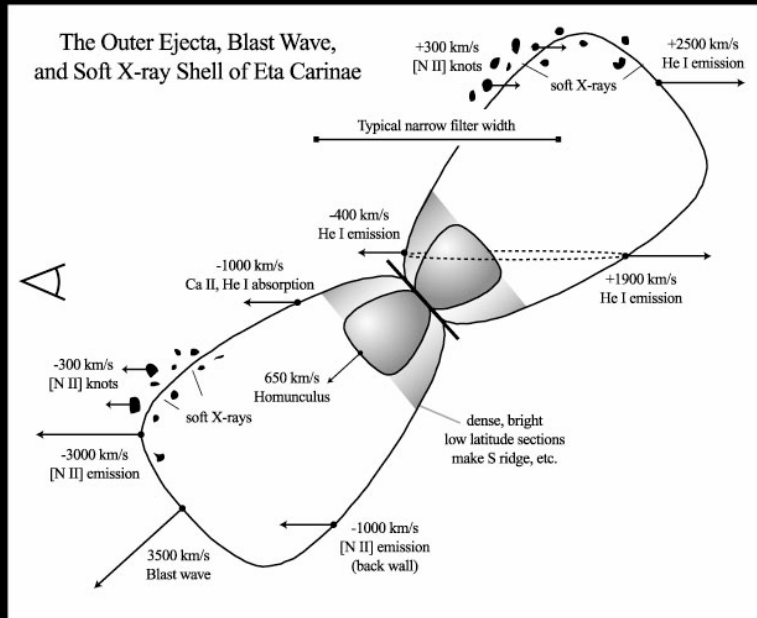


Created in RSpec Version 1.8

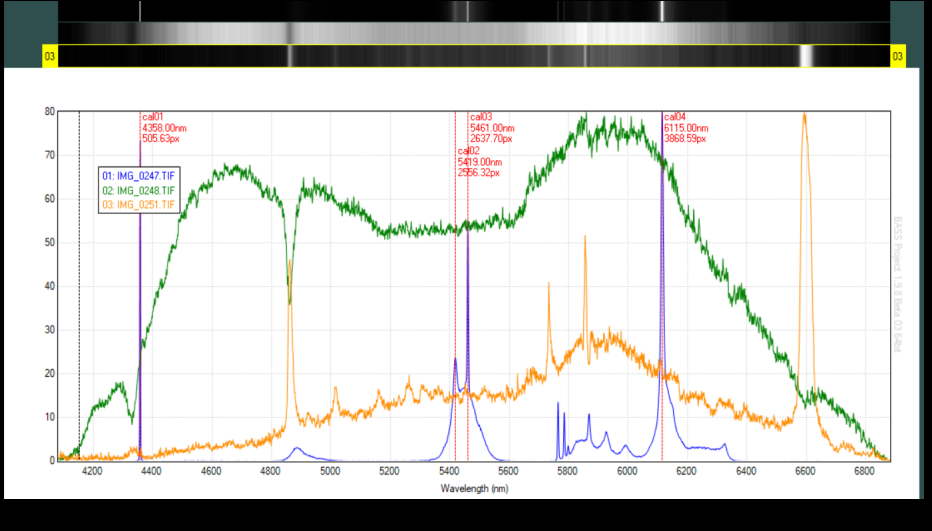
**ETA Carinae
Homunculus Nebula
expansion speed
measurement**



The Homunculus Nebula surrounding Eta Carinae



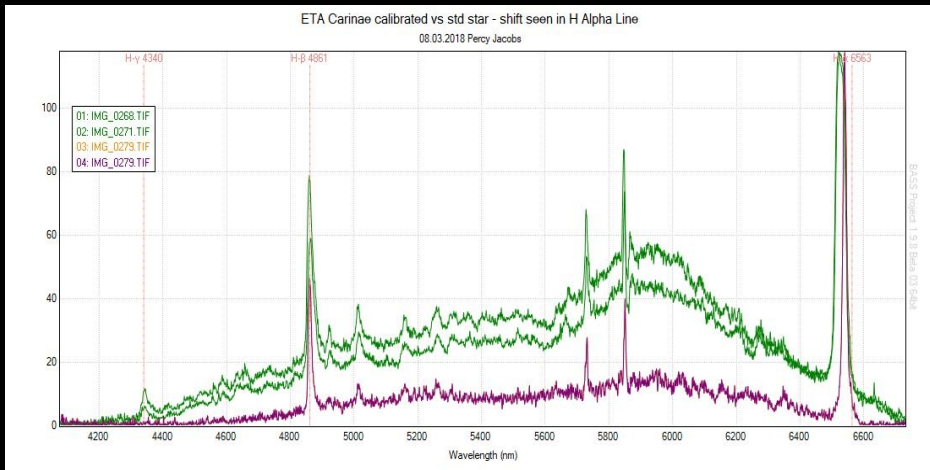
No expansion speed seen in the ETA Carinae "homunculus" nebula
Calibrated vs std star - H- γ 4340 Å & H- β 4861 Å
Note that I did not focus on the H- α line!



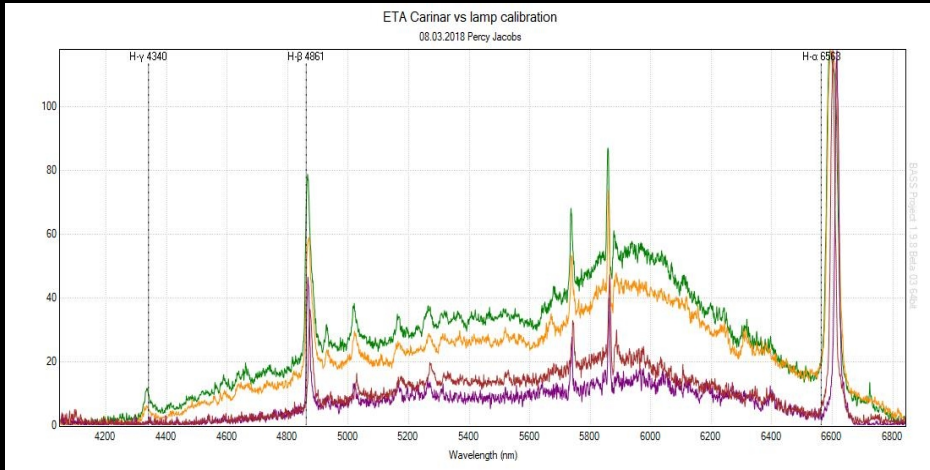
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References & Support

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Spectroscopic Atlas for Amateur Astronomers (no longer a free pdf download – now buy on-line through Cambridge University Press) - Version 5.0 04/2014 (if you send me an email, I can send you a pdf copy of Version 4)

Software

BASS Project (Basic Astronomical Spectroscopy Software by John Paraskeva -
http://www.aesesas.com/mediapool/142/1423849/data/DOCUMENTOS/BASS_Project_1_.pdf
Tom Field - RSpec - <http://www.rspec-astro.com>
Visual Spec - <http://www.astrosurf.com/vdesnoux>
Christian Buil - <http://www.astrosurf.com/~buil>

Individual Support

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Robin Leadbeater - THREE HILLS OBSERVATORY - (Formerly "ROBIN'S ASTRONOMY PAGE")
<http://www.threehillsobservatory.co.uk/astro/astro.htm>

**Christian Buil's
Visual Spec
software page &
home page**

Downloads
Visual Spec
Processing
Spectral analysis
Observations
Resource

Spectroscopy is not for me!
How to process spectrum...
What does it look like?...

Visual Spec

A universe to discover...

VISUAL SPEC IS A FREE SOFTWARE TO PROCESS ASTRONOMICAL SPECTRA...

Valérie Desnoix - AIDE Association

Spectroscopy, CCD and Astronomy

Spectroscopy, CCD & Astronomy: A site dedicated to the use of electronic detectors in the field of astronomy and spectroscopy

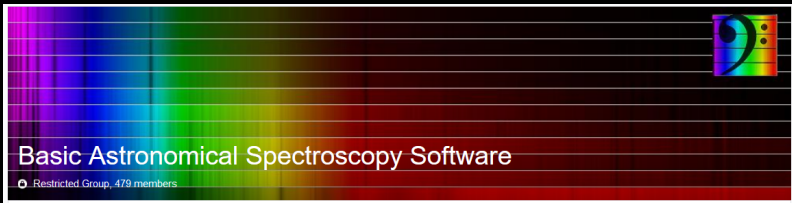
Welcome to Christian Buil home page

Home Observations Spectrographs Cameras Gallery IRIS software ISIS software Astro links Spectro links

Highlight...

- Atik Horizon / ASI1600MM
- Compare CCD and CMOS sensors
- Spectroscopy overview (focus on Alpy 6000)
- Integrated Spectrographic Innovative Software (ISIS) Version 5.2.2

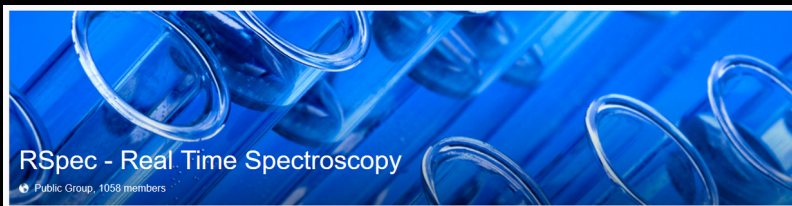
Yahoo Spectroscopy Groups



Basic Astronomical Spectroscopy Software
● Restricted Group, 479 members



Astronomical Amateur Spectroscopy / Spectroscopie Amateur en Astronomie
● Restricted Group, 726 members



RSpec - Real Time Spectroscopy
● Public Group, 1059 members

THANK YOU