

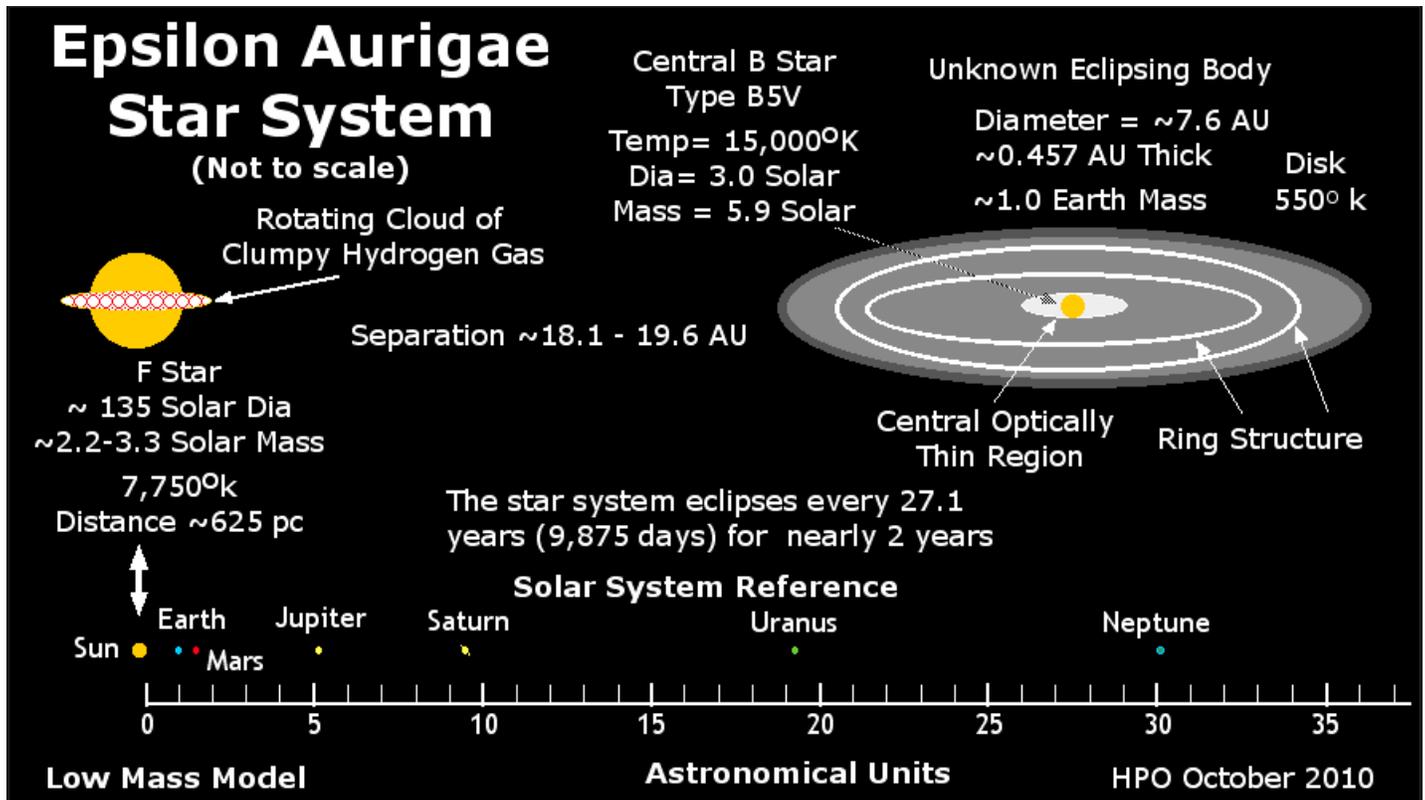
2009/2011

Epsilon Aurigae Eclipse

International Campaign Newsletter #24

Fall/Winter 2011

Final Newsletter



Jeffrey L. Hopkins, Editor
Hopkins Phoenix Observatory
(187283)

Dr. Robert E. Stencel, Co-editor
University of Denver

Robin Leadbeater, Co-editor
Three Hills Observatory

Campaign Web Site

<http://www.hposoft.com/Campaign09.html>

and

Epsilon Aurigae Forum

<http://tech.groups.yahoo.com/EpsilonAurigae/>

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Dr. Robert Stencel, University of Denver

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2 - 6 July 2012, Hvar, Croatia

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Editor's Remarks

Dear Colleagues,

We have completed a most successful Campaign to observe the latest eclipse of the Epsilon Aurigae star system. Observers from around the world have provided an unprecedented amounts of photometric and spectroscopic observations. Things have changed greatly since the 1982/84 eclipse because of the Internet, personal computers, CCD cameras and excellent quality yet reasonably priced spectroscopic equipment. It strains one's mind to imagine what will be available for the next eclipse in 27 years.

Continued Observations

Remember, even out-of-eclipse epsilon Aurigae presents some very interesting observing and through that continued observations both via photometry and spectroscopy may shed some light on the still unanswered questions about Epsilon Aurigae.

Photometry

There is an out-of-eclipse photometric variation that seems periodic, but defies efforts to pin down a period or periods. It seems to be between 50 and 70 days, but even that is not fixed. The amplitude changes are also varied and appear random. This is in all photometric bands.

Spectroscopy

From spectroscopy the hydrogen alpha emission horns continue their delightful and mysterious dance. One might think there is a correlation to the out-of-eclipse variations, but no such correlation has been found. There may be other spectroscopic lines that are changing and of interest. The sodium D lines for example.

The fall of 2011 present another unique opportunity. The eclipse of zeta Aurigae was timed to place it in an excellent observational position. A Zeta Aurigae Campaign was started with both photometric and spectroscopic observations reported. This Newsletter has a summation report for that Campaign. I wish to thank all those who contribute to this Campaign making it a success. In particular I wish to thank Frank Melillo for his enthusiasm and help as well as his valuable photometric and spectroscopic data.

Old age is quickly catching up with me and the Epsilon Aurigae is my final photometric project. I intend to continue spectroscopy work, however. The Epsilon Aurigae Campaign Web Site will be handed off to Brian Kloppenborg early in 2012. He will be maintaining it as he continues his study of Epsilon Aurigae. I will make an announcement when the change happens and while the original site will go away, I will provide a link from it to the new site.

It has been an honor to work with all the observers and an exciting time presenting papers, visiting the CHARA Observatory on Mount Wilson in Southern California to see Brian Kloppenborg make Interferometry Observations of Epsilon Aurigae and to visit Mount Hopkins in Southern Arizona and see Dr. Bob use the 8 meter telescope to do far infrared observations of Epsilon Aurigae.

Again I wish to thank the several dozen observers who contributed data to the Campaign. I especially wish to thank Dr. Bob for his enthusiasm, guidance and help with the Campaign.

The very best to all of you in the New Year!

Jeff
(187283)

IMPORTANT NOTICES

Data Copyright

Data in this and other Newsletters and on the Campaign web site are provided for viewing and downloading. Use of any data in any papers requires approval from the observer(s). Please contact me at phxjeff@hposoft.com or the specific observer(s) for more information and permission.

Standard Deviation versus Standard Error

There has been some discussion about whether to use standard deviation or standard error when reporting photometric observational data.

It is preferred that photometric observations include a standard deviation of at least three data points for each observed band for the session. The purpose is not to report an error, which is actually not what is important, but to give an idea of the quality of the observation and an idea of the data spread. That is all it does and all that it needs to do.

Standard error is the standard deviation divided by the square root of the number of samples. By have a large number of samples the standard can be much less than the standard deviation, yet the data spread can be the same. These means that while the standard error may look very good and much better than someone else's standard deviation, it is very misleading.

Please submit photometric data as an average of at least three data points with a standard deviation of the data. Thank you!

Yahoo Epsilon Aurigae Chat List Forum

As mentioned in the last Newsletter, we have started a chat list forum to enhance our communications. Lots of interesting things are happening and many time dependent. The Epsilon Aurigae Chat list will allow near instantaneous communication with everyone who is interested in the project. It's free and to sign up just go to

<http://tech.groups.yahoo.com/EpsilonAurigae/>

and sign up.

Zeta Aurigae Eclipse Report

Zeta Aurigae Photometry

Summary of zeta Aurigae Observations by Observer

| Obser | V Band | B Band | U Band | Rc Band | Rj Band | Ic Band | Ij Band | Total | Equip |
|--------|--------|--------|--------|---------|---------|---------|---------|-------|-------|
| DES - | 27 | | | | | | | 27 | DSLR |
| GO | 04 | | | | | | | 04 | CCD |
| VO - | 17 | | | | | | | 17 | DSLR |
| MM - | 4 | | | | | | | 4 | DSLR |
| FJM | 11 | 10 | | | | | | 11 | SSP=3 |
| SGGO - | 15 | | | | | | | 15 | CCD |
| WV - | 41 | 33 | | | | | | 74 | DSLR |
| Total | 123 | 43 | | | | | | 166 | XX |

Des Loughney (DES)

Edinburgh, Scotland, UK

Canon DSLR . 200 ISO . f4 . 85 mm lens. Exp 5 sec Eta Aurigae comparison star at V = 3.18

| UT Date | RJD | V Mag | SD |
|----------------------|----------|-------|-------|
| 27/28 July 2011 | 5770.710 | 3 | |
| 16/17 August 2011 | 5790.613 | 3.707 | 0.024 |
| 19/20 August 2011 | 5793.621 | 3.630 | 0.046 |
| 27/28 August 2011 | 5801.590 | 3.656 | 0.003 |
| 06/07 September 2011 | 5811.600 | 3.728 | 0.017 |
| 21/22 September 2011 | 5826.469 | 3.690 | 0.015 |
| 25/26 September 2011 | 5830.646 | 3.720 | 0.007 |
| 28/29 September 2011 | 5833.471 | 3.667 | 0.026 |
| 29/30 September 2011 | 5834.626 | 3.626 | 0.026 |
| 03/04 October 2011 | 5838.438 | 3.698 | 0.019 |
| 05/06 October 2011 | 5840.447 | 3.687 | 0.031 |
| 06/07 October 2011 | 5841.456 | 3.722 | 0.010 |
| 16/17 October 2011 | 5851.442 | 3.704 | 0.013 |
| 25/26 October 2011 | 5860.446 | 3.724 | 0.003 |
| 29/30 October 2011 | 5864.422 | 3.735 | 0.007 |
| 01/02 November 2011 | 5867.367 | 3.860 | 0.022 |
| 01/02 November 2011 | 5867.480 | 3.833 | 0.021 |
| 04/05 November 2011 | 5870.488 | 3.869 | 0.013 |
| 05/06 November 2011 | 5871.398 | 3.815 | 0.004 |
| 12/13 November 2011 | 5878.448 | 3.850 | 0.011 |
| 22/23 November 2011 | 5888.404 | 3.838 | 0.002 |
| 01/02 December 2011 | 5897.406 | 3.799 | 0.036 |
| 04/05 December 2011 | 5900.351 | 3.774 | 0.014 |
| 05/06 December 2011 | 5901.438 | 3.789 | 0.008 |
| 07/08 December 2011 | 5903.265 | 3.849 | 0.017 |
| 08/09 December 2011 | 5904.450 | 3.780 | 0.019 |
| 09/10 December 2011 | 5905.473 | 3.733 | 0.012 |
| 11/12 December 2011 | 5907.388 | 3.735 | 0.010 |
| 14/15 December 2011 | 5910.375 | 3.749 | 0.016 |
| 19/20 December 2011 | 5915.480 | 3.608 | 0.017 |
| 23/24 December 2011 | 5919.242 | 3.700 | 0.034 |

Frank J. Melillo (FJM)

Holtsville , NY USA

Lat:+ 40d 40' Long: 73 W Elevation: 100' Instrument: Optec SSP-3, Telescope: C-8 8"

Gate Time: 10 Seconds

| Date | RJD | V | SD | B | SD |
|----------------------|-----------|------|-------|------|-------|
| 02/03 September 2011 | 5807.7708 | 3.72 | 0.05 | 4.87 | 0.03 |
| 12/13 September 2011 | 5817.7222 | 3.70 | 0.06 | 4.85 | 0.07 |
| 18/19 September 2011 | 5823.7269 | 3.72 | | | |
| 29/30 September 2011 | 5834.7088 | 3.75 | 0.02 | 4.88 | 0.02 |
| 01/02 November 2011 | 5867.6791 | 3.94 | 0.035 | 5.39 | 0.018 |
| 02/03 November 2011 | 5868.7109 | 3.95 | 0.012 | 5.38 | 0.014 |
| 05/06 November 2011 | 5871.7658 | 3.95 | 0.014 | 5.41 | 0.012 |
| 12/13 November 2011 | 5878.7760 | 3.91 | 0.042 | 5.44 | 0.017 |
| 18/19 November 2011 | 5884.3168 | 3.94 | 0.026 | 5.41 | 0.014 |
| 24/25 November 2011 | 5890.7014 | 3.96 | 0.028 | 5.43 | 0.017 |
| 01/02 December 2011 | 5897.7285 | 3.94 | 0.069 | 5.42 | 0.005 |

Laurent Corp, Garden Observatory (GO),

Rodez, France

SBIG ST7 Cooled CCD - temp -20°C 50mm f/2.2 non diaphragmé, Comparisons: 3.261 / 2.949

| Date | RJD | V | SD |
|----------------|-----------|--------|-------|
| 28/29 Sep 2011 | 5833.562 | 3.7790 | 0.001 |
| 03/04 Oct 2011 | 5838.5776 | 3.7422 | 0.001 |
| 21/22 Oct 2011 | 5856.5817 | 3.7602 | 0.001 |
| 24/25 Nov 2011 | 5890.3764 | 3.9038 | 0.001 |

Mike Millar (MM)

Gallatin, TN USA, DSLR Transformed f2.5 ISO 200 Processed with AIP4Win

| Date | RJD | V | SD |
|---------------------|-----------|-------|-------|
| 21/22 November 2011 | 5883.5685 | 3.886 | 0.018 |
| 07/08 December 2011 | 5903.6324 | 3.899 | 0.069 |
| 23/24 November 2011 | 5889.6458 | 3.868 | 0.033 |
| 17/18 December 2011 | 5913.5146 | 3.751 | 0.003 |

Dr. Tiziano Colombo . S. Giovanni, Gatano al Observatory (SGGO)

Pisa, Italy, CCD Camera: Mead DSI Pro, 2 sec exposures, 20 images stacked , F 2.8

| RJD | V | Mag | SD |
|---------------------|-----------|-------|-------|
| 03/04 October 2011 | 5838.4958 | 3.75 | 0.01 |
| 14/15 October 2011 | 5849.4750 | 3.71 | 0.03 |
| 16/17 October 2011 | 5843.4851 | 3.71 | 0.06 |
| 21/22 October 2011 | 5856.4542 | 3.77 | 0.04 |
| 26/27 October 2011 | 5861.4785 | 3.732 | 0.006 |
| 28/29 October 2011 | 5863.4417 | 3.77 | 0.050 |
| 30/31 October 2011 | 5865.4681 | 3.92 | 0.03 |
| 30/31 October 2011 | 5865.4701 | 3.93 | 0.02 |
| 30/31 October 2011 | 5865.4715 | 3.93 | 0.03 |
| 30/31 October 2011 | 5865.4736 | 3.94 | 0.04 |
| 30/31 October 2011 | 5865.4754 | 3.92 | 0.02 |
| 30/31 October 2011 | 5865.4778 | 3.90 | 0.02 |
| 14/15 November 2011 | 5880.4694 | 3.91 | 0.001 |
| 21/22 November 2011 | 5886.4028 | 3.92 | 0.001 |
| 25/26 November 2011 | 5891.3666 | 3.89 | 0.01 |

Thomas Karlsson, Varberg Observatory (VO)

Varberg, Sweden

Observation using: Canon 450D 6 second exposures EF 35 - 80 mm

Comparison star is lambda Aurigae V= 4.705

| Date | RJD | V | SD |
|----------------------|-----------|-------|-------|
| 01/02 September 2011 | 5806.4757 | 3.754 | 0.008 |
| 07/08 October 2011 | 5842.3785 | 3.764 | 0.011 |
| 10/11 October 2011 | 5845.4285 | 3.753 | 0.018 |
| 13/14 October 2011 | 5848.2292 | 3.764 | 0.018 |
| 20/21 October 2011 | 5855.4597 | 3.765 | 0.009 |
| 22/23 October 2011 | 5857.3938 | 3.748 | 0.003 |
| 25/26 October 2011 | 5860.3658 | 3.748 | 0.003 |
| 28/29 October 2011 | 5863.3597 | 3.756 | 0.005 |
| 30/31 October 2011 | 5865.4417 | 3.754 | 0.005 |
| 10/11 November 2011 | 5876.3278 | 3.917 | 0.010 |
| 12/13 November 2011 | 5878.3028 | 3.936 | 0.011 |
| 25/26 November 2011 | 5891.2708 | 3.910 | 0.004 |
| 27/28 November 2011 | 5893.4993 | 3.941 | 0.011 |
| 30/01 Nov/Dec 2011 | 5896.3319 | 3.910 | 0.003 |
| 05/06 December 2011 | 5901.3382 | 3.942 | 0.015 |
| 07/08 December 2011 | 5903.3590 | 3.918 | 0.008 |
| 19/20 December 2011 | 5915.4000 | 3.761 | 0.004 |

Wolfgang Vollmann (WV)

Vienna, Austria

Images: DSLR Canon 450D, Lens 1:2,8 f=50mm, Exposure time 13 seconds, ISO 400

Reduction: AIP4WINV2 Averages from 20 images each -- from this the standard deviation was calculated.

V-magnitudes: from green channel transformed to Johnson V with Photometry5.xls by Thomas Karlsson/ B-

magnitudes: from blue channel using B magnitudes of the comparison stars

| Date | JD | Mag V | SD | Mag B* | SD |
|-------------|--------------|-------|-------|--------|-------|
| 2011 Sep.10 | 2455815.4590 | 3.745 | 0.045 | | |
| 2011 Sep.13 | 2455817.6153 | 3.777 | 0.023 | | |
| 2011 Sep.24 | 2455829.4479 | 3.728 | 0.019 | | |
| 2011 Sep.27 | 2455831.6444 | 3.774 | 0.018 | 4.724 | 0.025 |
| 2011 Sep.28 | 2455832.6396 | 3.779 | 0.036 | | |
| 2011 Okt.1 | 2455836.4333 | 3.774 | 0.022 | 4.735 | 0.019 |
| 2011 Okt.3 | 2455837.6583 | 3.816 | 0.028 | | |
| 2011 Okt.4 | 2455838.6417 | 3.811 | 0.034 | | |
| 2011 Okt.5 | 2455839.6583 | 3.853 | 0.015 | 4.735 | 0.038 |
| 2011 Okt.13 | 2455848.4188 | 3.764 | 0.048 | 4.733 | 0.041 |
| 2011 Okt.14 | 2455849.3896 | 3.734 | 0.032 | | |
| 2011 Okt.15 | 2455849.6826 | 3.804 | 0.005 | | |
| 2011 Okt.15 | 2455850.4597 | 3.778 | 0.003 | | |
| 2011 Okt.16 | 2455850.6556 | 3.809 | 0.038 | | |
| 2011 Okt.17 | 2455851.6597 | 3.785 | 0.008 | 4.728 | 0.011 |
| 2011 Okt.18 | 2455853.3854 | 3.745 | 0.047 | 4.749 | 0.024 |
| 2011 Okt.19 | 2455853.6403 | 3.825 | 0.011 | 4.743 | 0.022 |
| 2011 Okt.21 | 2455856.4240 | 3.762 | 0.039 | 4.750 | 0.014 |
| 2011 Okt.22 | 2455856.6757 | 3.825 | 0.016 | 4.707 | 0.032 |
| 2011 Okt.31 | 2455865.6292 | 3.832 | 0.083 | 4.763 | 0.050 |
| 2011 Okt.31 | 2455866.4080 | 3.889 | 0.048 | 5.013 | 0.033 |

Wolfgang Vollmann (WV) Continued

| Date | JD | Mag V | SD | Mag B* | SD |
|-------------|--------------|-------|-------|--------|-------|
| 2011 Okt.31 | 2455866.4847 | 3.926 | 0.029 | 5.079 | 0.029 |
| 2011 Nov.2 | 2455868.37 | 3.935 | 0.039 | 5.107 | 0.043 |
| 2011 Nov.2 | 2455868.2868 | | | 5.037 | 0.029 |
| 2011 Nov.5 | 2455871.4361 | 3.932 | 0.016 | 5.107 | 0.066 |
| 2011 Nov.7 | 2455872.638 | 3.995 | 0.027 | 5.037 | 0.027 |
| 2011 Nov.8 | 2455874.4486 | 3.945 | 0.048 | 5.110 | 0.073 |
| 2011 Nov.10 | 2455875.5222 | 3.960 | 0.023 | 5.119 | 0.043 |
| 2011 Nov.12 | 2455878.4104 | 3.940 | 0.047 | 5.119 | 0.054 |
| 2011 Nov.14 | 2455879.6688 | 3.993 | 0.058 | 5.023 | 0.092 |
| 2011 Nov.27 | 2455892.6354 | 3.896 | 0.062 | 5.044 | 0.054 |
| 2011 Nov.27 | 2455892.6882 | 3.988 | 0.034 | 5.031 | 0.034 |
| 2011 Nov.28 | 2455893.6660 | 4.027 | 0.029 | 5.078 | 0.034 |
| 2011 Nov.28 | 2455894.3361 | 3.942 | 0.018 | 5.102 | 0.022 |
| 2011 Nov.29 | 2455894.6611 | 4.004 | 0.022 | 5.042 | 0.026 |
| 2011 Dez.5 | 2455901.2479 | 3.927 | 0.019 | 5.110 | 0.044 |
| 2011 Dez.5 | 2455901.3153 | 3.941 | 0.017 | 5.098 | 0.022 |
| 2011 Dez.8 | 2455903.6750 | 4.026 | 0.044 | 5.111 | 0.045 |
| 2011 Dez.8 | 2455904.2285 | | | 5.103 | 0.069 |
| 2011 Dez.8 | 2455904.3361 | 3.918 | 0.037 | 5.060 | 0.021 |
| 2011 Dez.11 | 2455907.2313 | 3.782 | 0.025 | 4.748 | 0.027 |
| 2011 Dez.11 | 2455907.3292 | 3.771 | 0.024 | 4.720 | 0.017 |
| 2011 Dez.13 | 2455908.5660 | 3.866 | 0.019 | 4.742 | 0.057 |

RJD = JD - 2,450,000

Plot Observer Key

DES - Des Loughney, Edinburgh, Scotland, UK

FJM - Frank J. Melillo, Holtsville, New York, USA

GO - Laurent Corp, Garden Observatory, Rodez, France

MM - Mike Millar, Gallatin, TN, USA

SGGO - Tiziano Colombo, S. Giovanni Gatano al Observatory, Pisa, Italy

WV - Wolfgang Vollmann, Vienna, Austria

Photometric Plots

Note: Full resolution images of the photometric data plots can be seen at:

Zeta Aurigae

V Band Plot:

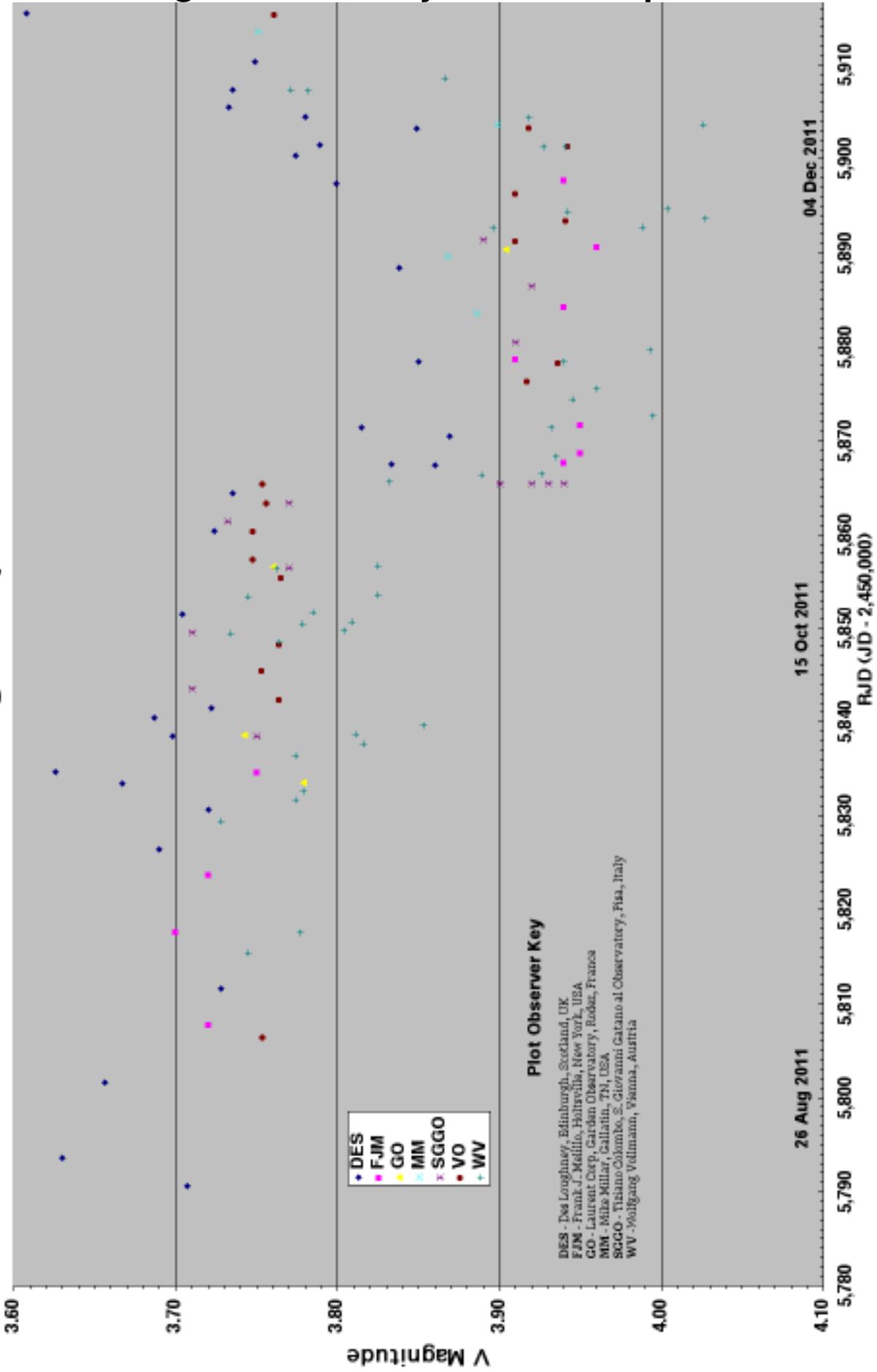
<http://www.hposoft.com/zPlots/VFall11.jpg>

V Band Plot:

<http://www.hposoft.com/zPlots/BFall11.jpg>

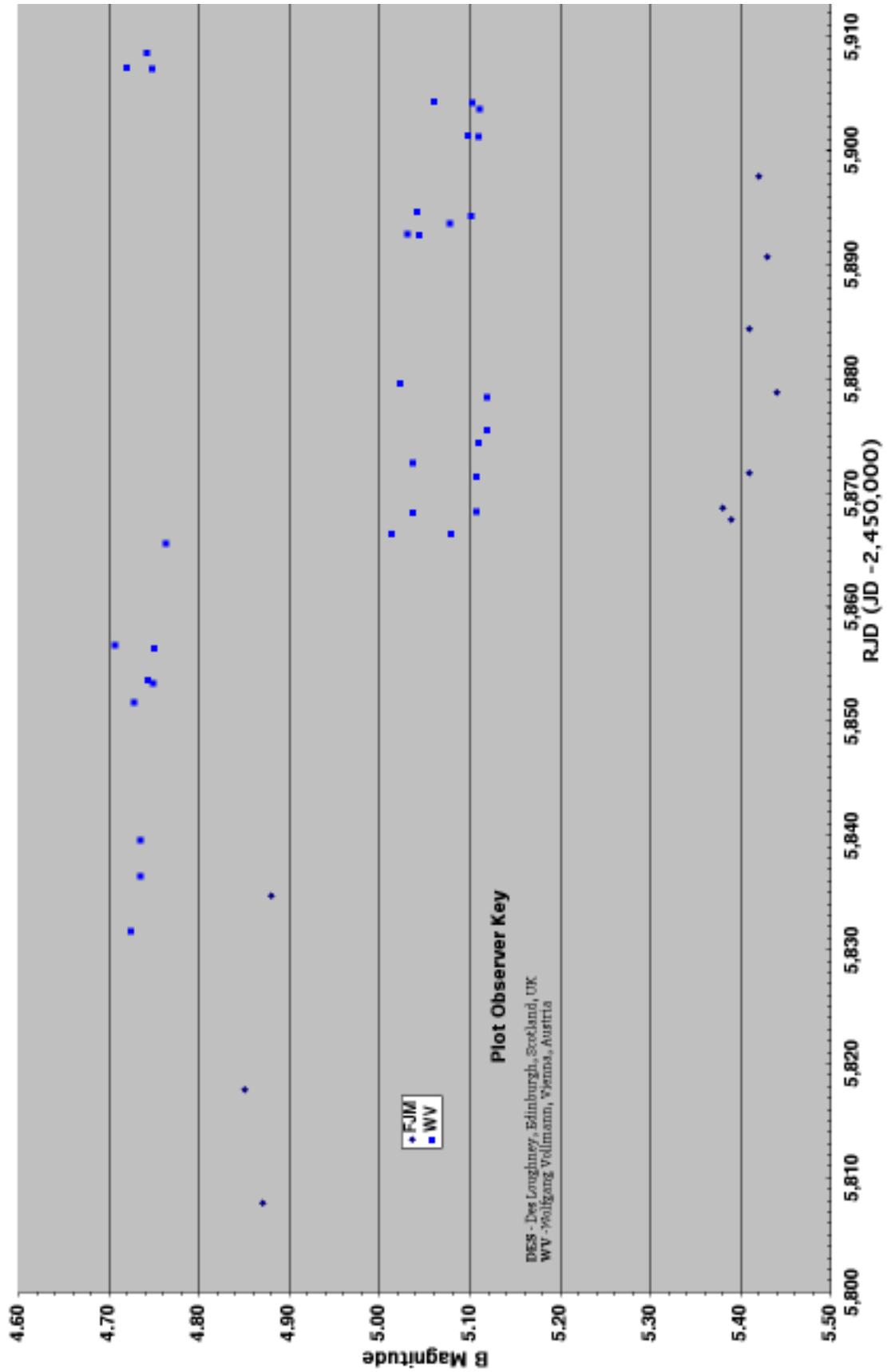
Zeta Aurigae Photometry V Data Composite Plot

Zeta Aurigae Eclipse Fall 2011

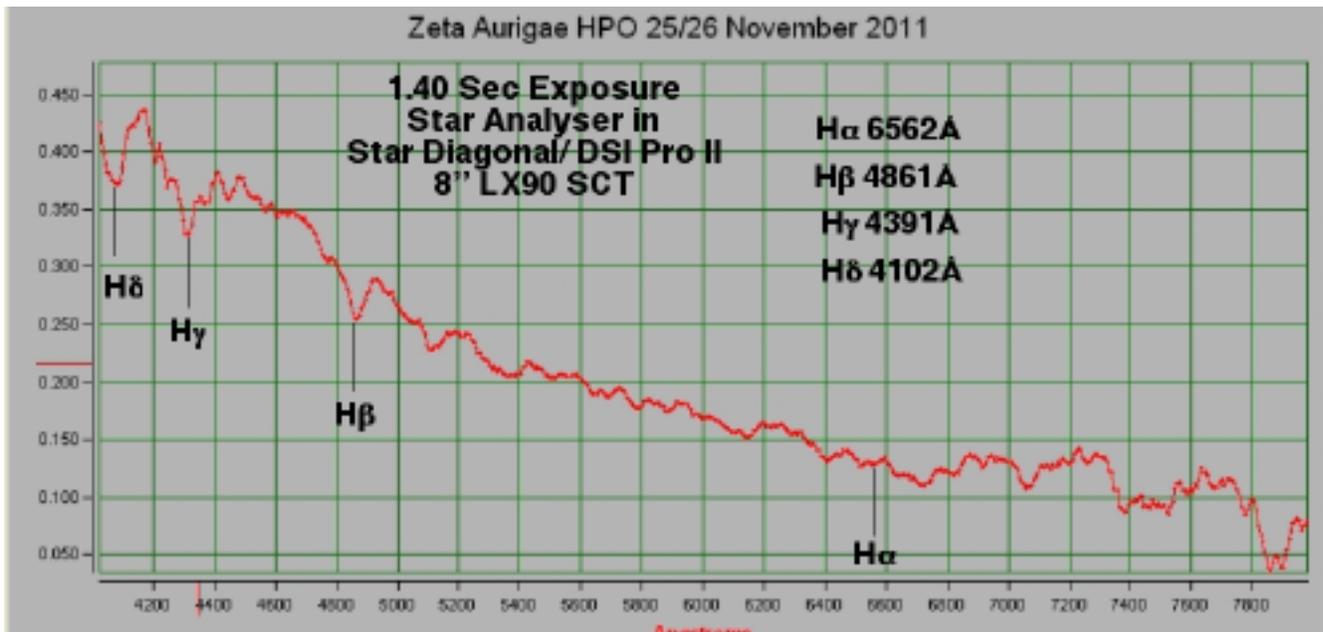


Zeta Aurigae Photometry B Data Composite Plot

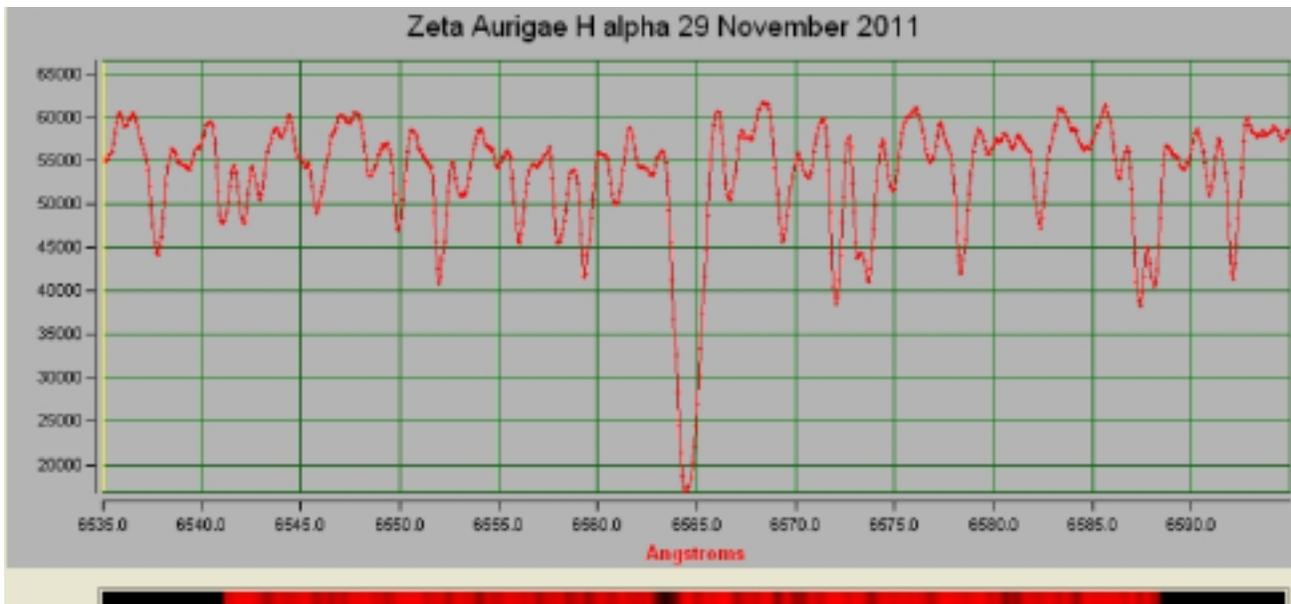
Zeta Aurigae Eclipse Fall 2011



Zeta Aurigae Spectroscopy

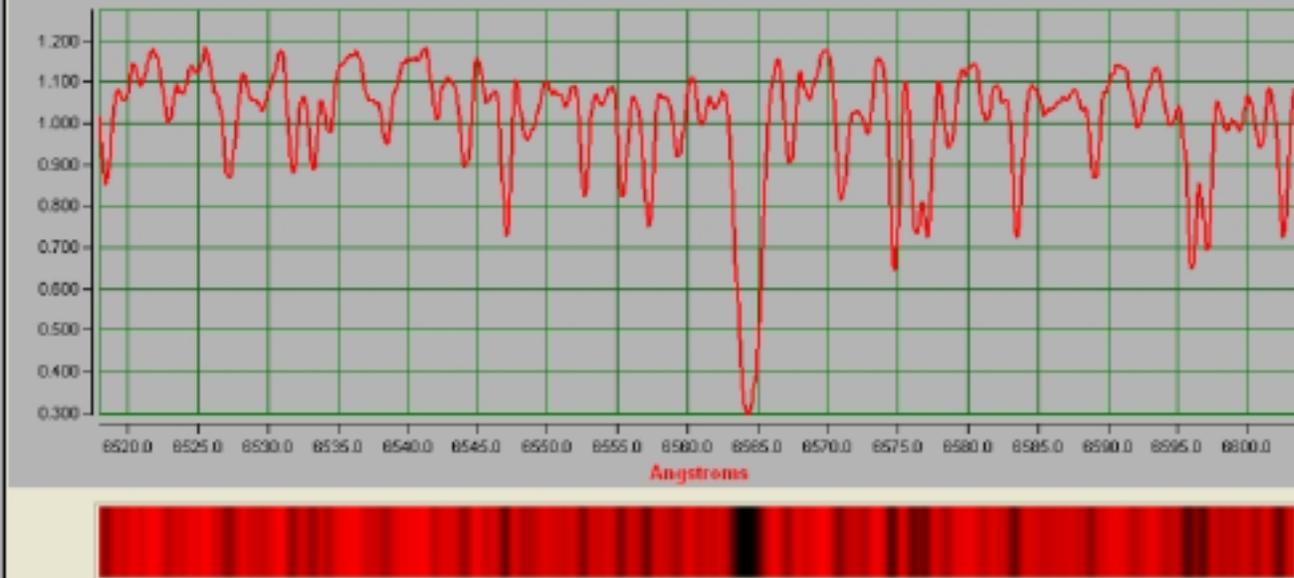


Hopkins Phoenix Observatory 25/26 November 2011
Low Resolution Spectrum of Zeta Aurigae



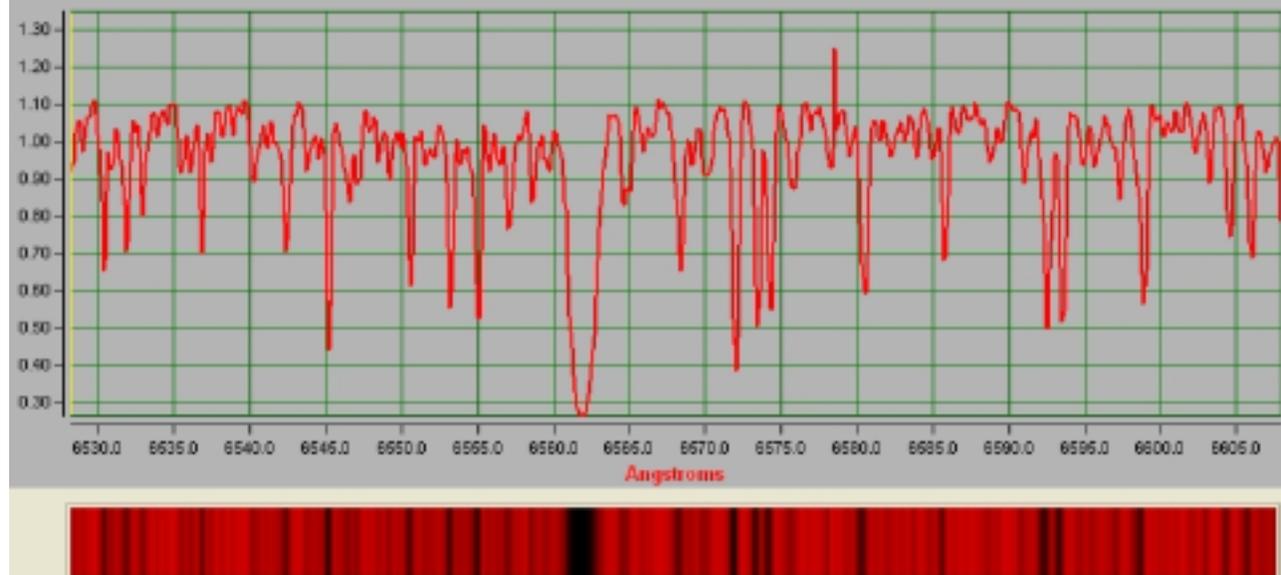
Hopkins Phoenix Observatory 07 December 2011
Zeta Aurigae Hydrogen Alpha Line

Zeta Aurigae Hydrogen Alpha - HPO - 07 December 2011

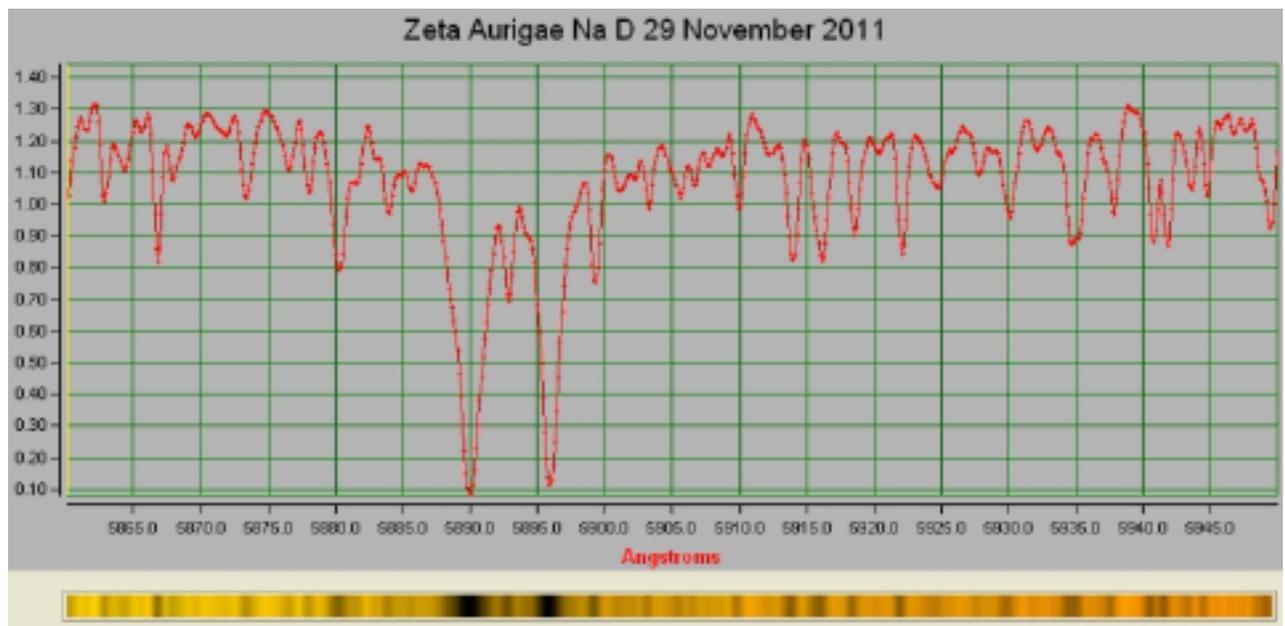


Hopkins Phoenix Observatory 10 December 2011
Zeta Aurigae Hydrogen Alpha Line

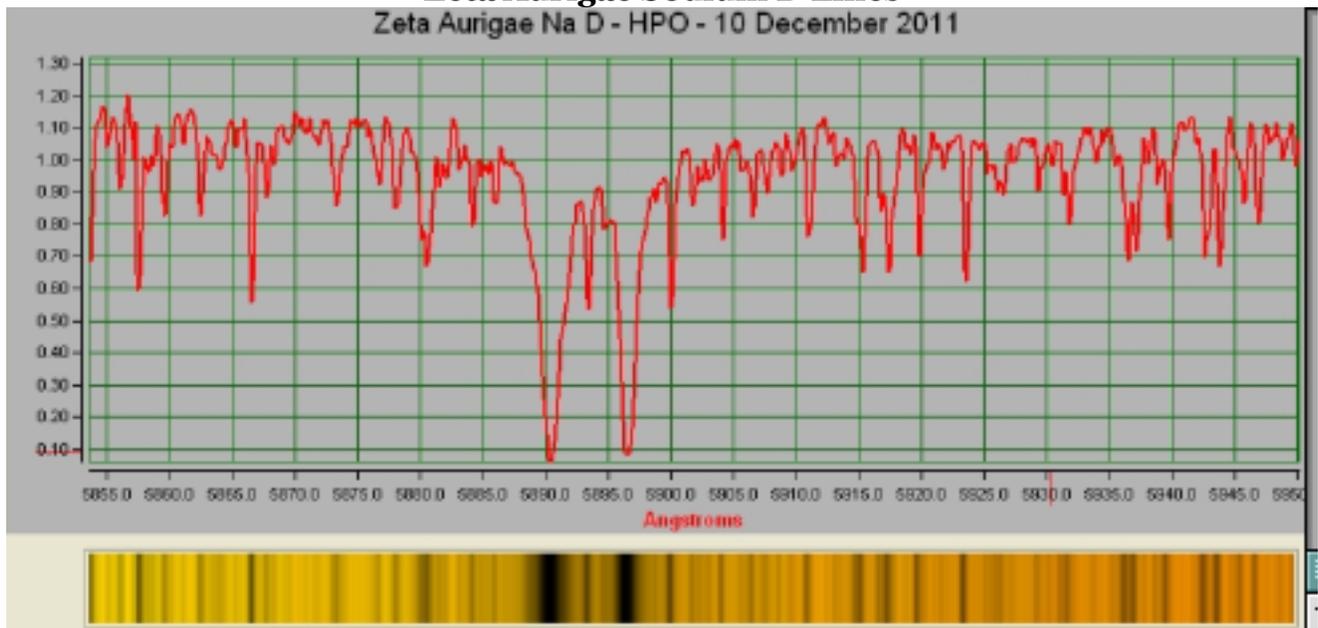
Zeta Aurigae Hydrogen Alpha - HPO - 10 December 2011



Hopkins Phoenix Observatory 29 November 2011
Zeta Aurigae Sodium D Lines



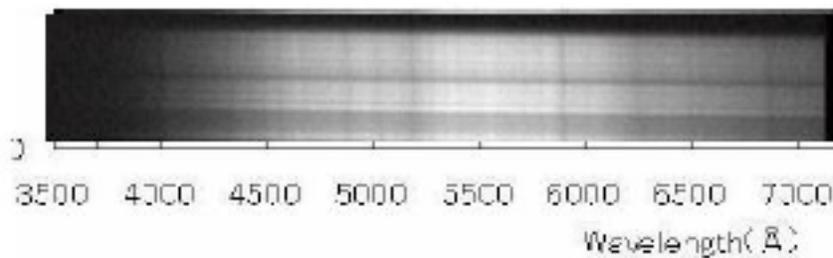
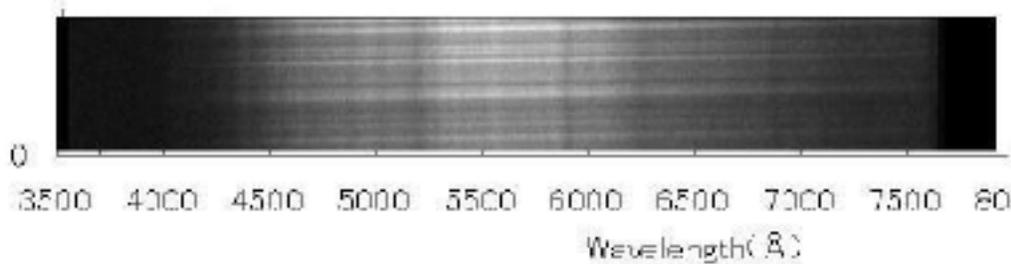
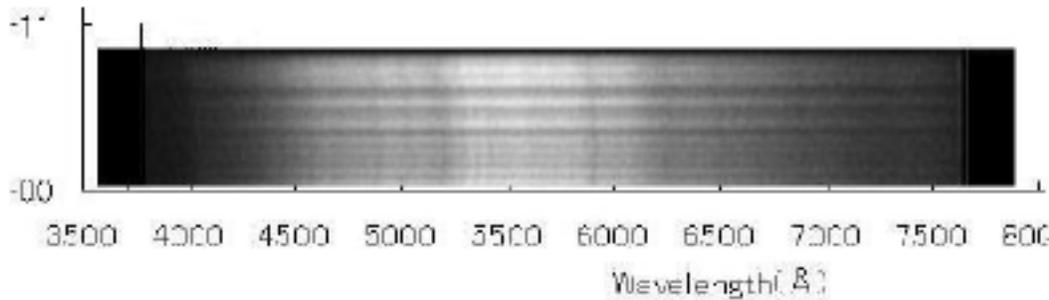
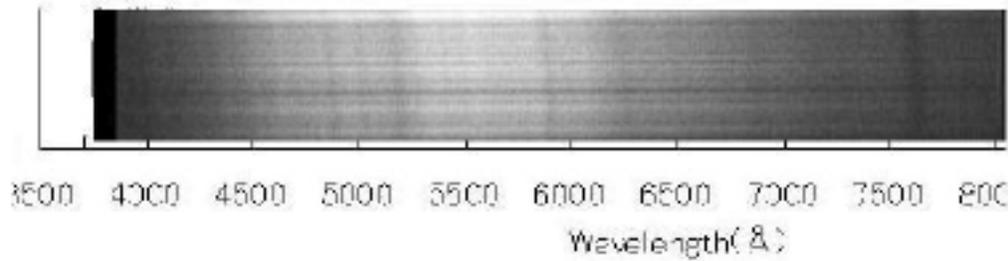
Hopkins Phoenix Observatory 10 December 2011
Zeta Aurigae Sodium D Lines



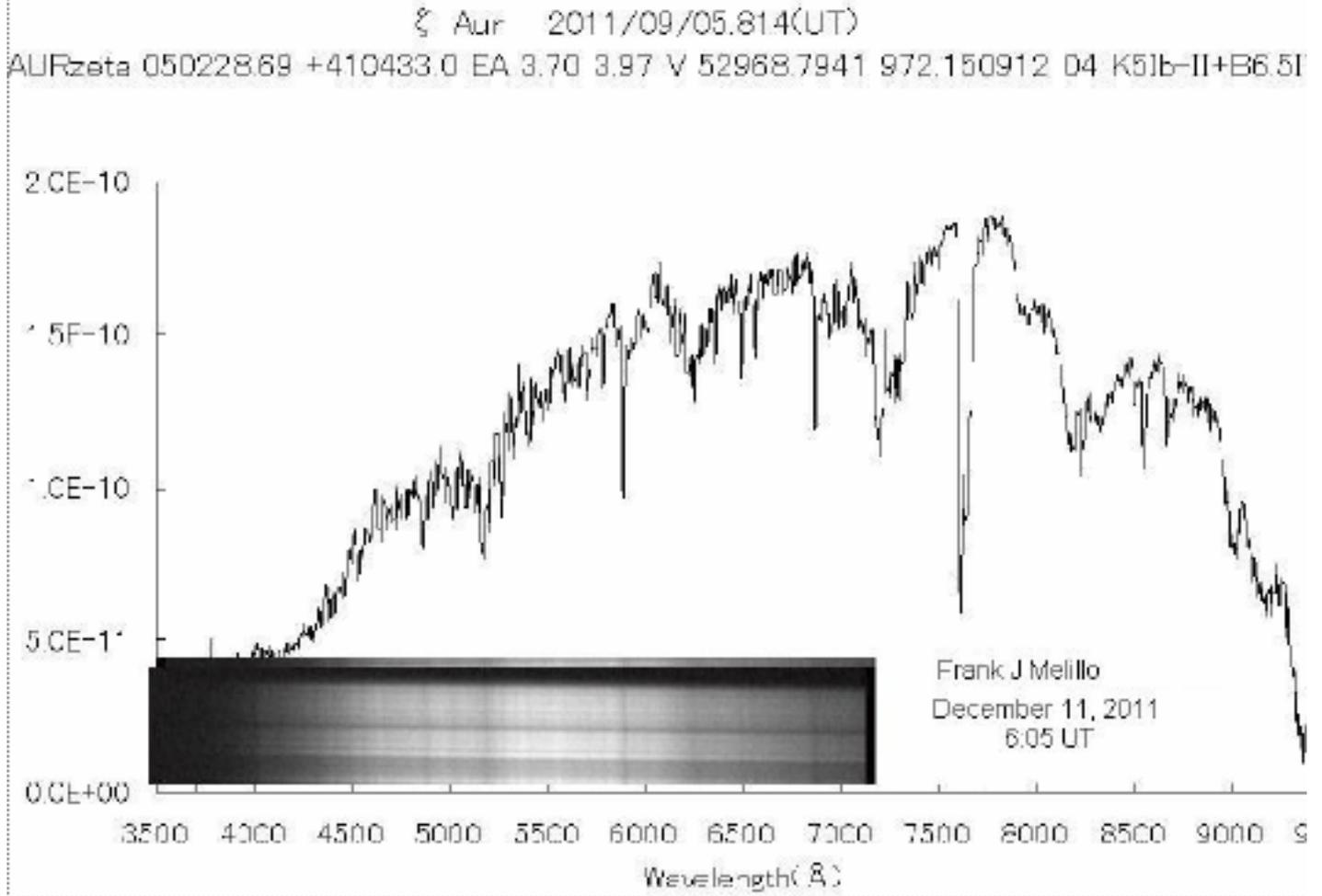
Frank Melillo
Low Resolution Spectra of Zeta Aurigae
06 October 2011

Zeta Aurigae spectra
on special dates

Frank J Melillo
Holtsville, NY
MEADE 10-inch
Starlight Xpress MX-5
Rainbow Optics grating cell



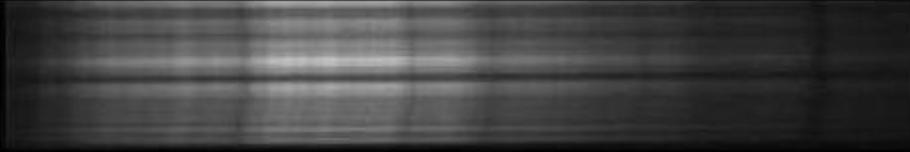
Frank Melillo 11 December 2011
Low Resolution Spectra of Zeta Aurigae



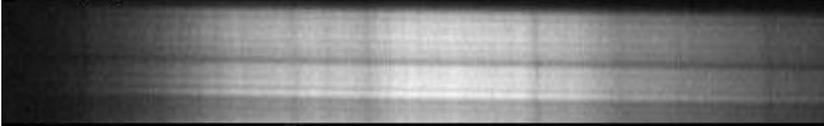
11 December 2011

Zeta Aurigae spectra
December 11, 2011
6:05 UT

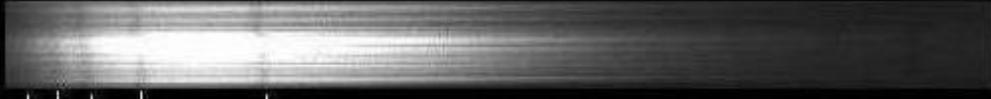
Frank J Melillo
Holtsville, NY
10-inch Lx200
Starlight Xpress MX-5
Rainbow Optis grating cell



Aldebaran
Class K5 type



Zeta Aurigae



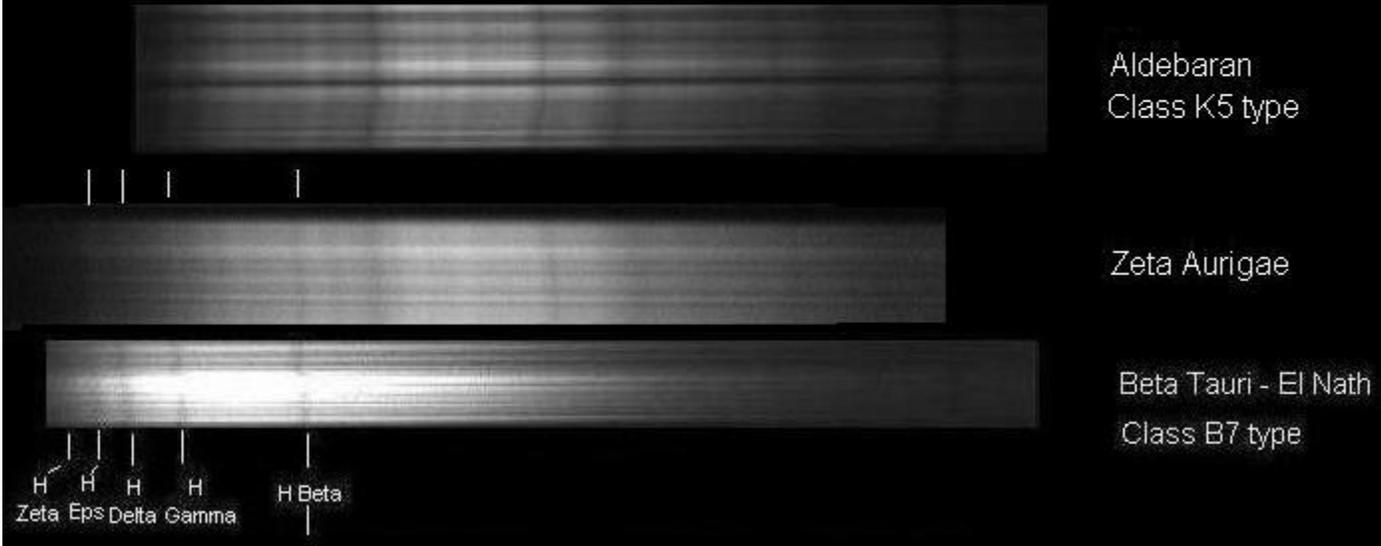
Beta Tauri - El Nath
Class B7 type



12 December 2011

Zeta Aurigae spectra
December 12, 2011
5:30 UT

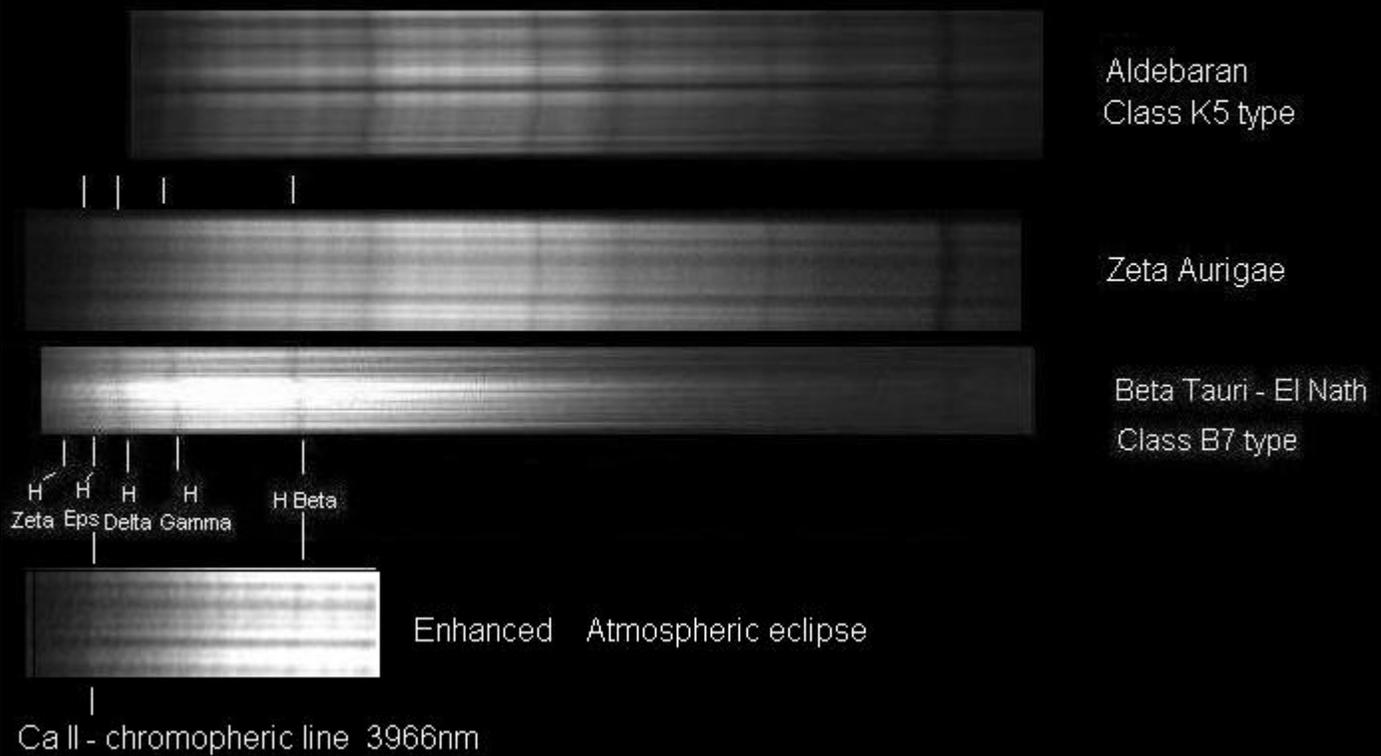
Frank J Melillo
Holtsville, NY
10-inch Lx200
Starlight Xpress MX-5
Rainbow Optis grating cell



19 December 2011

Zeta Aurigae spectra
December 19, 2011
4:00 UT

Frank J Melillo
Holtsville, NY
10-inch Lx200
Starlight Xpress MX-5
Rainbow Optis grating cell



19 December 2011

Epsilon Aurigae Photometry Report

by

Jeffrey Hopkins

Hopkins Phoenix Observatory

Summary of epsilon Aurigae Observations by Observer

| Obser | V Band | B Band | U Band | Rc Band | Rj Band | Ic Band | Ij Band | Total | Equip |
|-------|--------|--------|--------|---------|---------|---------|---------|-------|-------|
| CH - | 143 | | | | | | | 143 | DSLR |
| CO - | 3 | | | | | | | 3 | CCD |
| CQJ - | 100 | 100 | | | | 95 | | 295 | CCD |
| DES - | 242 | | | | | | | 238 | DSLR |
| EAO - | 68 | | | | | | | 68 | CCD |
| EGO - | 81 | | | | | | | 81 | DSLR |
| EUO - | 1 | 39 | 9 | | 40 | | | 89 | PMT |
| FJM - | 65 | | | | | | | 65 | SSP-3 |
| GHO - | 165 | | | | | 160 | | 325 | CCD |
| GO - | 22 | | | 20 | | | | 42 | CCD |
| GS - | 179 | 178 | | 183 | | 181 | | 721 | CCD |
| GVO - | 13 | 8 | | | 13 | | 13 | 47 | SSP-3 |
| HPO - | 147 | 209 | 209 | | | | | 565 | PMT |
| JBO - | 16 | 41 | | | 16 | | 16 | 89 | SSP-3 |
| JESO- | 34 | | | | | | | 34 | |
| KO - | 111 | | | | | | | 111 | CCD |
| LO - | 87 | | | | | | | 87 | SSP-3 |
| MSO - | 3 | 3 | | | | | | 6 | CCD |
| NKO - | 38 | | | | | | | 38 | DSLR |
| NPO - | | | | | 18 | | 18 | 36 | SSP-3 |
| RES - | 56 | | | | | | | 56 | DSLR |
| RLO - | 29 | | | | | | | 29 | DSLR |
| SGGO- | 67 | 17 | | 59 | | | | 143 | CCD |
| TP - | 86 | | | | | | | 86 | DSLR |
| VO - | 193 | | | | | | | 193 | DSLR |
| WVC- | 50 | 42 | | | | | | 92 | DSLR |
| Total | 1999 | 637 | 218 | 262 | 87 | 436 | 47 | 3686 | XX |

The above is a summary of data taken from the data plots. While the data is mainly from just the beginning of the eclipse, the UB data contain data from before the eclipse so the actual number of observations total is greater, but during the eclipse the UB data contains data from before. As of 26 July 2011 we have over 3,600 total observations during the eclipse with the visual band having by far the most at over 1,900 observations from 26 observers from around the world..

Plot Observer Key

CH - Colin Henshaw, Tabuk, Saudi Arabia
CO - Steve Orlando, Custer Observatory, East Northport, NY, USA
CQJ - John Centala, Eastern Iowa, USA
DES - Des Loughney, Edinburgh, Scotland, UK
EAO - Elizabeth Observatory of Athens, Iakovos Marios Strikis, Haldrf (Athens) Greece
EGO - East Greenwood Observatory, Charles Hofferber, East Grand Forks, Minnesota, USA
EUO - Ege University Observatory, Serdar Evren, Izmir, Turkey
FJM - Frank J. Melillo, Holtsville, New York, USA
GHO - Golden Hill Observatory, Richard Miles, Dorset, England
GO - Laurent Corp, Garden Observatory, Rodez, France
GS - Gerard Samolyk, Greenfield, Wisconsin, USA
GVO - Grand View Observatory, Brian E. McCandless, Elkton, MD. USA
HPO - Hopkins Phoenix Observatory, Jeff Hopkins, Phoenix, Arizona. USA
JBO - Jim Beckmann Observatory, Paul J. Beckmann, Mendota Heights, MN. USA
JESO - Jalna Education Society Observatory, Dr. Mukund Kurtadikar, Maharashtra, India
KO - Hans-Goran Lindberg, Kaerrbo Observatory, Skultuna, Sweden
LO - Lindarberg Observatory, Snaevarr Gudmundsson, Hafnarfjordur, Iceland
MSO - Arvind Paranjpye, MVS IUCAA Observatory, Ganeshkhind Pune, India
NKO - Nils Karlsen, Nils Karlsen Observatory, Umea, Sweden
NPO - Gary Frey, North Pines Observatory, Mayer, Arizona. USA
RES - Dr. Robert E. Stencel, University of Denver, Denver, Colorado. USA
RLO - Hubert Hautecler, Roosbeek Lake Observatory, Boutersem Brabant, Belgium
SGGO - Tiziano Colombo, S. Giovanni Gatano al Observatory, Pisa, Italy
TP - Tom Pearson, Virginia Beach, Virginia, USA
VO - Thomas Karlsson, Varberg Observatory, Varberg, Sweden
WWC - Donald Collins, Warren Wilson College, Ashville, North Carolina, USA

IMPORTANT NOTICE

Please review the photometric plots and look for your data. See how close they are to the rest of the reported magnitudes at about the same time. Most data are excellent, but some are obvious flyers. If your data are varying significantly from others, you may want to reexamine your reduction and/or procedures.

Photometric Archive

UBVRcRjIcIjJH Band data is now archived and can be downloaded at

<http://www.hposoft.com/EAuro9/Data/UBVRIJHData.html>

Photometric Plots

Note: Full resolution images of the photometric data plots can be seen at:

Epsilon Aurigae

V Band Plot:

<http://www.hposoft.com/Plots09/VFall09.jpg>

UB Band Plots:

<http://www.hposoft.com/Plots09/UBFall09.jpg>

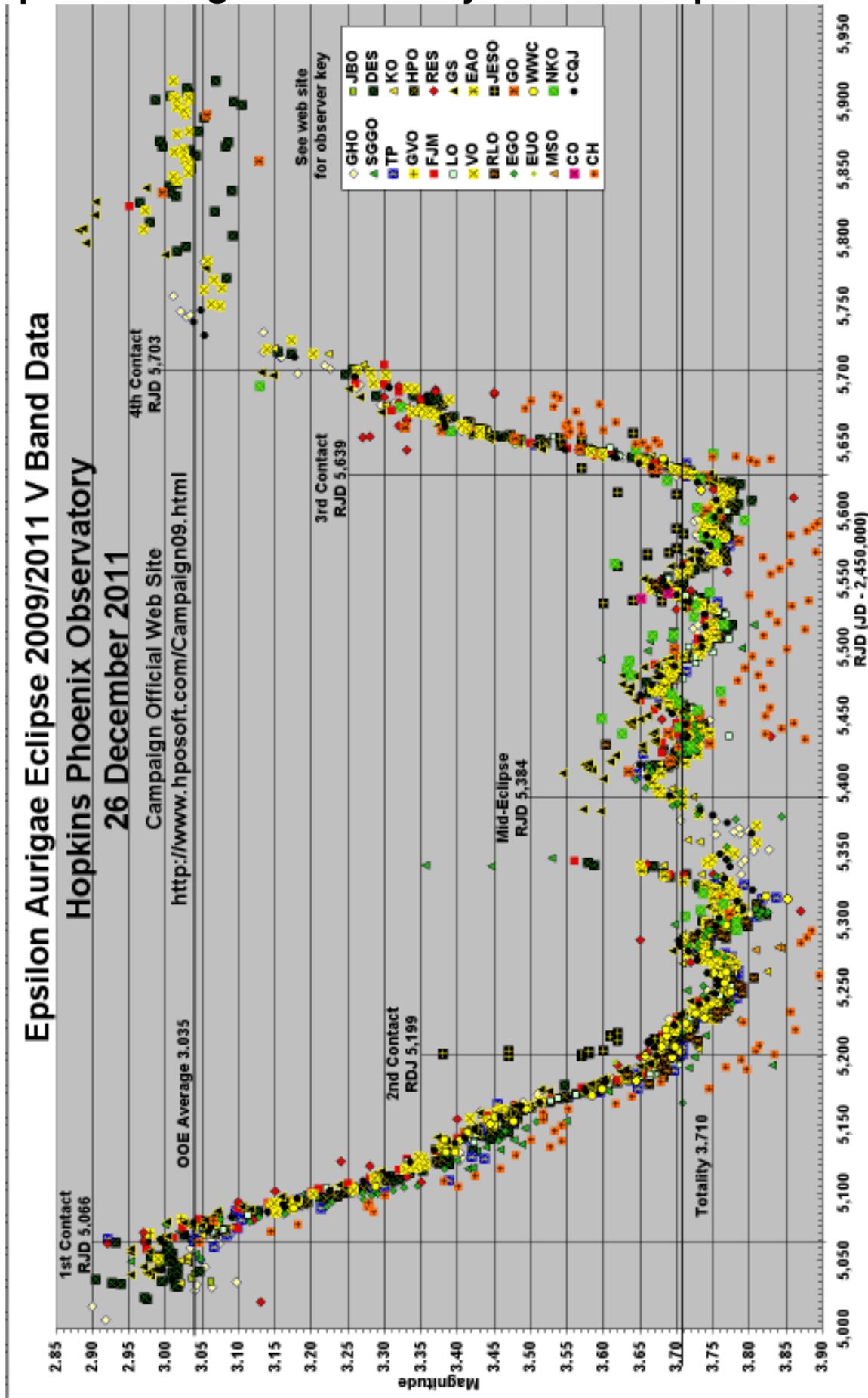
RI Band Plots:

<http://www.hposoft.com/Plots09/RIFall09.jpg>

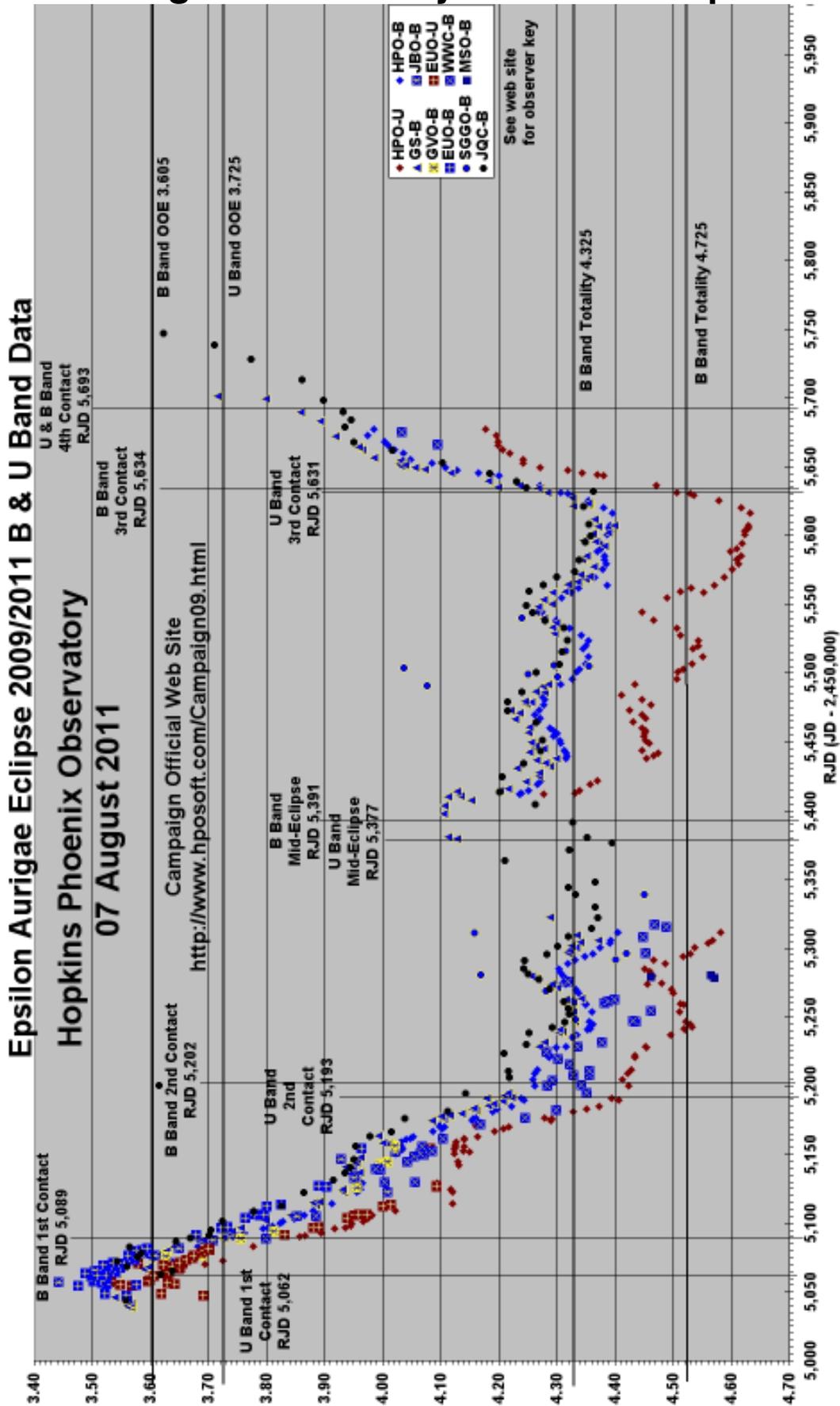
JH Band Plots:

<http://www.hposoft.com/Plots09/JHFall09.jpg>

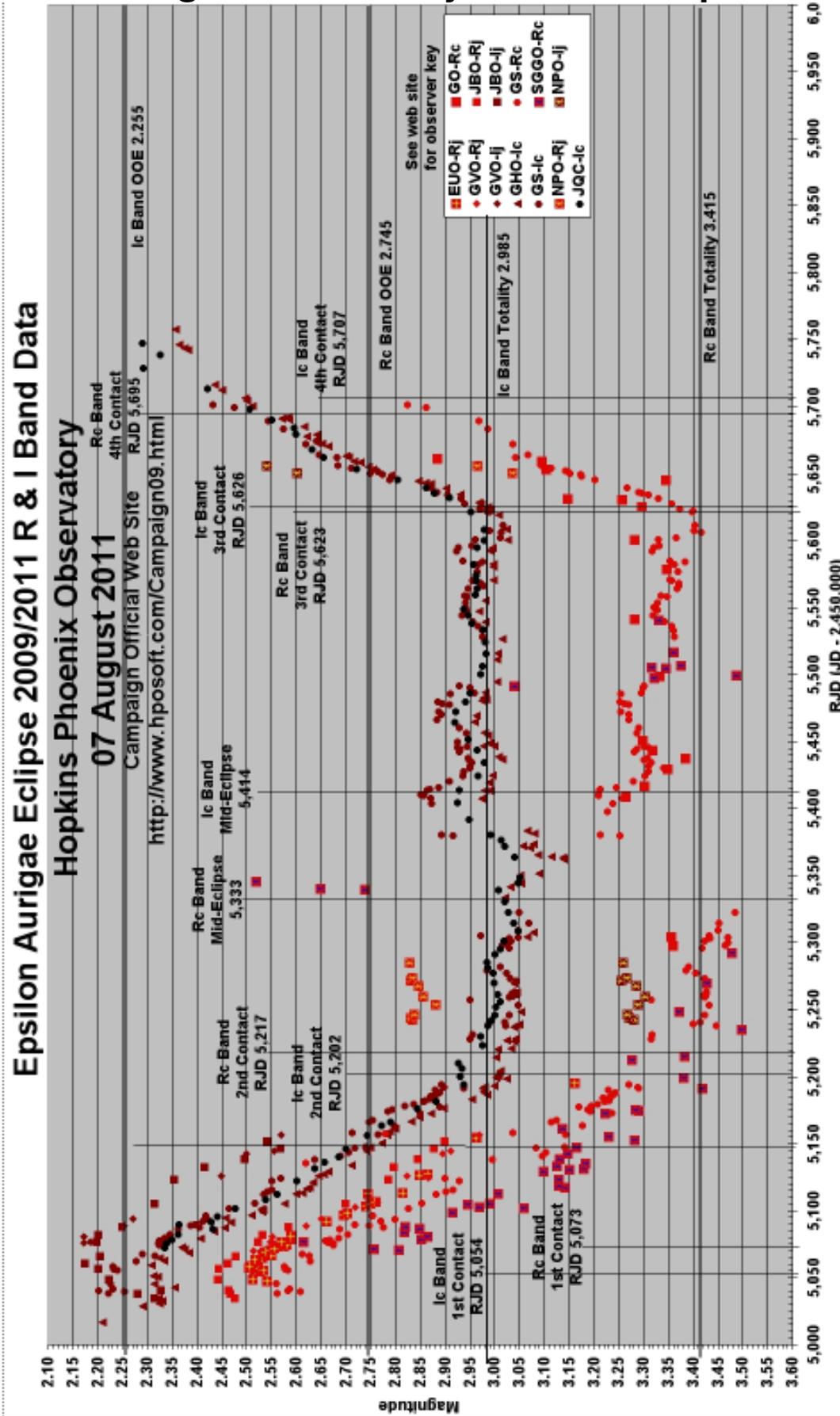
Epsilon Aurigae Photometry V Data Composite Plot



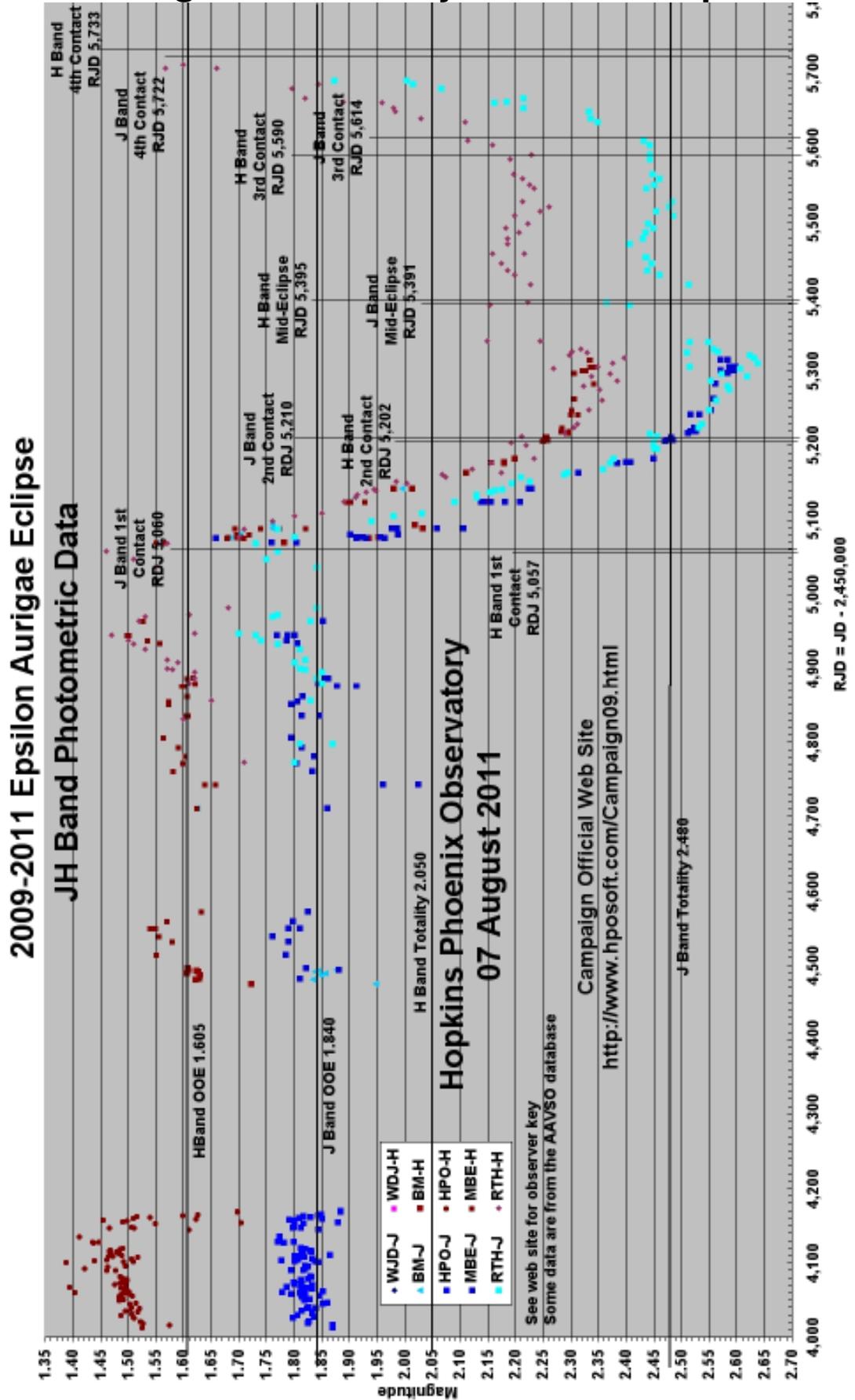
Epsilon Aurigae Photometry UB Data Composite Plot



Epsilon Aurigae Photometry RI Data Composite Plot



Epsilon Aurigae Photometry JH Data Composite Plot



Photometric Observers

Colin Henshaw (CH)

Tabuk, Saudi Arabia

Canon 30D with Carl Zeis 135mm lens

Eta Aurigae Comparison V= 3.18

Note: Data not transformed or extinction corrected

| UT Date | RJD | V |
|-----------------|--------|--------|
| 17 August 10 | 5426.5 | 3.7022 |
| 23 August 10 | 5432.5 | 3.8761 |
| 27 August 10 | 5436.5 | 3.822 |
| 31 August 10 | 5440.5 | 3.8446 |
| 04 September 10 | 5444.5 | 3.8609 |
| 09 September 10 | 5449.5 | 3.8222 |
| 15 September 10 | 5455.5 | 3.8285 |
| 19 September 10 | 5459.5 | 3.7625 |
| 30 September 10 | 5470.5 | 3.8182 |
| 05 October 10 | 5475.5 | 3.7839 |
| 09 October 10 | 5479.5 | 3.8121 |
| 14 October 10 | 5484.5 | 3.7935 |
| 18 October 10 | 5488.5 | 3.8285 |
| 23 October 10 | 5493.4 | 3.8039 |
| 28 October 10 | 5498.4 | 3.8518 |
| 03 November 10 | 5504.4 | 3.9029 |
| 07 November 10 | 5508.4 | 3.8202 |
| 12 November 10 | 5513.4 | 3.8768 |
| 17 November 10 | 5518.4 | 3.8378 |
| 23 November 10 | 5524.4 | 3.8272 |
| 29 November 10 | 5530.3 | 3.858 |
| 03 December 10 | 5534.4 | 3.8816 |
| 07 December 10 | 5538.3 | 3.7995 |
| 22 December 10 | 5553.3 | 3.8299 |
| 26 December 10 | 5557.3 | 3.8418 |
| 31 December 10 | 5562.3 | 3.8559 |
| 04 January 11 | 5566.2 | 3.818 |
| 08 January 11 | 5570.3 | 3.8919 |
| 13 January 11 | 5575.3 | 3.9277 |
| 20 January 11 | 5582.2 | 3.8565 |
| 23 January 11 | 5585.2 | 3.8784 |
| 26 January 11 | 5588.2 | 3.889 |
| 29 January 11 | 5591.2 | 3.894 |
| 07 February 11 | 5600.2 | 3.9093 |
| 11 February 11 | 5604.2 | 3.9115 |
| 17 February 11 | 5610.2 | 3.9514 |
| 21 February 11 | 5614.2 | 3.9168 |
| 25 February 11 | 5618.2 | 3.9089 |
| 02 March 11 | 5623.3 | 3.9328 |
| 07 March 11 | 5628.3 | 3.9234 |
| 14 March 11 | 5635.3 | 3.8095 |
| 16 March 11 | 5637.2 | 3.8012 |
| 17 March 11 | 5638.3 | 3.8294 |
| 18 March 11 | 5639.2 | 3.7495 |

Colin Henshaw (CH) Continued

| UT Date | RJD | V |
|-------------|--------|--------|
| 19 March 11 | 5640.3 | 3.7817 |
| 25 March 11 | 5646.2 | 3.6614 |
| 28 March 11 | 5649.2 | 3.6764 |
| 28 March 11 | 5649.3 | 3.6444 |
| 29 March 11 | 5650.2 | 3.6539 |
| 31 March 11 | 5652.2 | 3.6716 |
| 04 April 11 | 5656.2 | 3.5499 |
| 05 April 11 | 5657.2 | 3.5706 |
| 06 April 11 | 5658.2 | 3.5546 |
| 07 April 11 | 5659.2 | 3.5998 |
| 10 April 11 | 5662.2 | 3.5477 |
| 11 April 11 | 5663.2 | 3.5687 |
| 12 April 11 | 5664.2 | 3.5518 |
| 13 April 11 | 5665.2 | 3.617 |
| 21 April 11 | 5673.2 | 3.5628 |
| 23 April 11 | 5675.2 | 3.4919 |
| 24 April 11 | 5676.2 | 3.5316 |
| 26 April 11 | 5678.2 | 3.5953 |
| 29 April 11 | 5681.2 | 3.5007 |
| 01 May 11 | 5683.2 | 3.539 |
| 03 May 11 | 5685.2 | 3.5325 |

Des Loughney (DES)

Edinburgh, Scotland, UK

Canon DSLR . 200 ISO . f4 . 85 mm lens. Exposure 5 seconds

Eta Aurigae used as the comparison star at $V = 3.18$

Des uses a remote switch to activate the Canon 200 Digital Single Lens Reflex (DSLR) camera with 85 mm lens. He takes between 10 and 20 exposures stacks and processes 5 sets of them with AIP4WIN.

| UT Date | RJD | V Mag | SDV |
|----------------------|----------|-------|-------|
| 27/28 July 2011 | 5770.710 | 3.083 | 0.012 |
| 16/17 August 2011 | 5790.613 | 3.016 | 0.023 |
| 19/20 August 2011 | 5793.621 | 3.028 | 0.019 |
| 27/28 August 2011 | 5801.590 | 3.092 | 0.004 |
| 06/07 September 2011 | 5811.600 | 2.979 | 0.013 |
| 21/22 September 2011 | 5826.469 | 2.965 | 0.017 |
| 25/26 September 2011 | 5830.646 | 3.014 | 0.007 |
| 28/29 September 2011 | 5833.471 | 3.007 | 0.039 |
| 29/30 September 2011 | 5834.626 | 3.091 | 0.029 |
| 03/04 October 2011 | 5838.438 | 3.004 | 0.021 |
| 05/06 October 2011 | 5840.447 | 3.016 | 0.035 |
| 06/07 October 2011 | 5841.456 | 3.011 | 0.006 |
| 16/17 October 2011 | 5851.442 | 3.035 | 0.020 |
| 25/26 October 2011 | 5860.446 | 3.042 | 0.008 |
| 29/30 October 2011 | 5864.422 | 3.032 | 0.007 |
| 01/02 November 2011 | 5867.367 | 2.996 | 0.019 |
| 01/02 November 2011 | 5867.480 | 3.082 | 0.007 |
| 04/05 November 2011 | 5870.488 | 3.086 | 0.004 |
| 05/06 November 2011 | 5871.398 | 2.992 | 0.011 |
| 12/13 November 2011 | 5878.448 | 3.045 | 0.007 |
| 22/23 November 2011 | 5888.404 | 3.053 | 0.024 |

Des Loughney (DES) Continued

| | | | | | |
|-------|----------|------|----------|-------|-------|
| 01/02 | December | 2011 | 5897.406 | 3.105 | 0.021 |
| 04/05 | December | 2011 | 5900.351 | 3.093 | 0.013 |
| 05/06 | December | 2011 | 5901.438 | 2.986 | 0.011 |
| 07/08 | December | 2011 | 5903.265 | 2.995 | 0.014 |
| 08/09 | December | 2011 | 5904.450 | 3.006 | 0.002 |
| 09/10 | December | 2011 | 5905.473 | 3.033 | 0.004 |
| 12/12 | December | 2011 | 5907.388 | 3.030 | 0.009 |
| 14/15 | December | 2011 | 5910.375 | 3.029 | 0.013 |
| 19/20 | December | 2011 | 5915.480 | 3.069 | 0.009 |
| 23/24 | December | 2011 | 5919.242 | 3.023 | 0.034 |

Gerard Samolyk (GS)

Greenfield, Wisconsin . USA

Equipment, CCD Camera and Camera Lens , ST9XE + 50 mm lens

Comparison star lambda Aurigae; B= 5.329; V= 4.705; Rc= 4.340; Ic= 3.998

| RJD | V | SD | B | SD | Rc | SD | Ic | SD |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5777.8887 | 3.633 | 0.037 | 3.055 | 0.024 | 2.687 | 0.012 | 2.296 | 0.016 |
| 5787.8889 | 3.563 | 0.047 | 3.000 | 0.023 | 2.651 | 0.010 | 2.306 | 0.01 |
| 5796.8884 | 3.502 | 0.034 | 2.891 | 0.028 | 2.517 | 0.010 | 2.210 | 0.019 |
| 5805.8786 | 3.512 | 0.016 | 2.881 | 0.030 | 2.540 | 0.008 | 2.213 | 0.009 |
| 5806.8417 | 3.488 | 0.027 | 2.887 | 0.026 | 2.530 | 0.015 | 2.203 | 0.016 |
| 5816.8743 | 3.523 | 0.030 | 2.903 | 0.029 | 2.569 | 0.010 | 2.234 | 0.014 |
| 5826.8033 | 3.550 | 0.018 | 2.904 | 0.036 | 2.571 | 0.006 | 2.240 | 0.008 |
| 5836.7680 | 3.559 | 0.012 | 2.973 | 0.025 | 2.604 | 0.018 | 2.263 | 0.02 |

Richard Miles, Golden Hill Observatory (GHO)

Stourton Caundle, Dorset, England, Time Zone: GMT = 0 hours

Latitude/Longitude/Altitude (ASL): West 2.405 deg, North 50.931 deg

Telescope: 0.06-m Refractor (Takahashi FS60C)

Filters: Johnson V=4.71 for lambda Aurigae, Cousins Ic= 3.99 for HD32655

Detector: CCD Camera (Type: Starlight Xpress SXV-H9)

Note: as of 01 January 2010 all previous data has been corrected. The following data is an updated list of the correct data. Some V band data was calculated using lambda Aurigae and some HD32655. It appears HD32655 may be variable. For data 94 August 2010 and after the comparison stars used were HD 72328 for V band with magnitude V= 7.64 and HD 32655 for Ic band with Ic= 5.65.

| Date | RJD | V mag | SD | Ic | SD |
|-------------------|-----------|-------|-------|-------|-------|
| 08/09 August 2011 | 5782.5760 | 3.052 | 0.013 | 2.307 | 0.021 |

Laurent Corp, Garden Observatory (GO),

Rodez, France

SBIG ST7 Cooled CCD - temp -20°C

50mm f/2.2 non diaphragmé

Comparisons: 3.261 / 2.949

| Date | RJD | V | SD | Rc | SD |
|----------------|-----------|--------|-------|--------|-------|
| 28/29 Sep 2011 | 5833.562 | 2.996 | 0.001 | | |
| 03/04 Oct 2011 | 5838.5776 | | | | |
| 21/22 Oct 2011 | 5856.5817 | 3.1254 | 0.001 | | |
| 24/25 Nov 2011 | 5890.3764 | 3.0560 | 0.001 | 2.9060 | 0.001 |

Robert E. Stencel, University of Denver (RES)

Denver, Colorado USA

DSLRL V Band Data, Comparison Star eta Aurigae assumed to be V-3

.17

| UT DATE | RJD | V | SD |
|----------------|------------|----------|-----------|
| 04/05 May 2011 | 5686.65 | 3.45 | 0.05 |
| 06/07 May 2011 | 5687.65 | 3.37 | 0.13 |
| 09/10 May 2011 | 5691.64 | 3.32 | 0.06 |

Thomas Karlsson, Varberg Observatory (VO)

Varberg, Sweden

Observation using: Canon 450D 6 second exposures EF 35 - 80 mm

Comparison star is lambda Aurigae V= 4.705

| Date | RJD | V | SD | X |
|----------------------|------------|----------|-----------|----------|
| 26/27 July 2011 | 5769.4438 | 3.066 | 0.021 | 3.471 |
| 09/10 August 2011 | 5783.4438 | 3.057 | 0.037 | 2.005 |
| 01/02 September 2011 | 5806.4757 | 2.970 | 0.012 | |
| 07/08 October 2011 | 5842.3785 | 3.016 | 0.016 | |
| 10/11 October 2011 | 5845.4285 | 3.011 | 0.011 | |
| 13/14 October 2011 | 5848.2292 | 3.031 | 0.019 | |
| 20/21 October 2011 | 5855.4597 | 3.032 | 0.007 | |
| 22/23 October 2011 | 5857.3938 | 3.027 | 0.012 | |
| 25/26 October 2011 | 5860.3658 | 3.026 | 0.002 | |
| 28/29 October 2011 | 5863.3597 | 3.012 | 0.002 | |
| 30/31 October 2011 | 5865.4417 | 3.024 | 0.002 | |
| 10/11 November 2011 | 5876.3278 | 3.016 | 0.010 | |
| 12/13 November 2011 | 5878.3028 | 3.033 | 0.026 | |
| 25/26 November 2011 | 5891.2708 | 3.028 | 0.008 | |
| 27/28 November 2011 | 5893.4993 | 3.025 | 0.029 | |
| 30/01 Nov/Dec 2011 | 5896.3319 | 3.016 | 0.008 | |
| 05/06 December 2011 | 5901.3382 | 3.032 | 0.004 | |
| 07/08 December 2011 | 5903.3590 | 3.010 | 0.001 | |
| 19/20 December 2011 | 5915.4000 | 3.000 | 0.011 | |

RJD = JD - 2,450,000

Epsilon Aurigae Spectroscopy Report

by



Robin Leadbeater
Three Hills Observatory
robin_astro@hotmail.com

Overview

Since the last newsletter a further 70 amateur spectra have been submitted to the campaign bringing the total to 836. These latest spectra are listed in the table below and a list of all spectra can be found at

http://www.threehillsobservatory.co.uk/epsaur_spectra.htm

Although the eclipse finished photometrically some time ago, the extended semi transparent region of the eclipsing object is still producing absorption lines in the spectrum. These are likely to be detectable into early 2012 so continued spectroscopic coverage at all wavelengths and at highest resolution for specific lines is needed for a few more months and occasionally thereafter to establish a post eclipse base line.

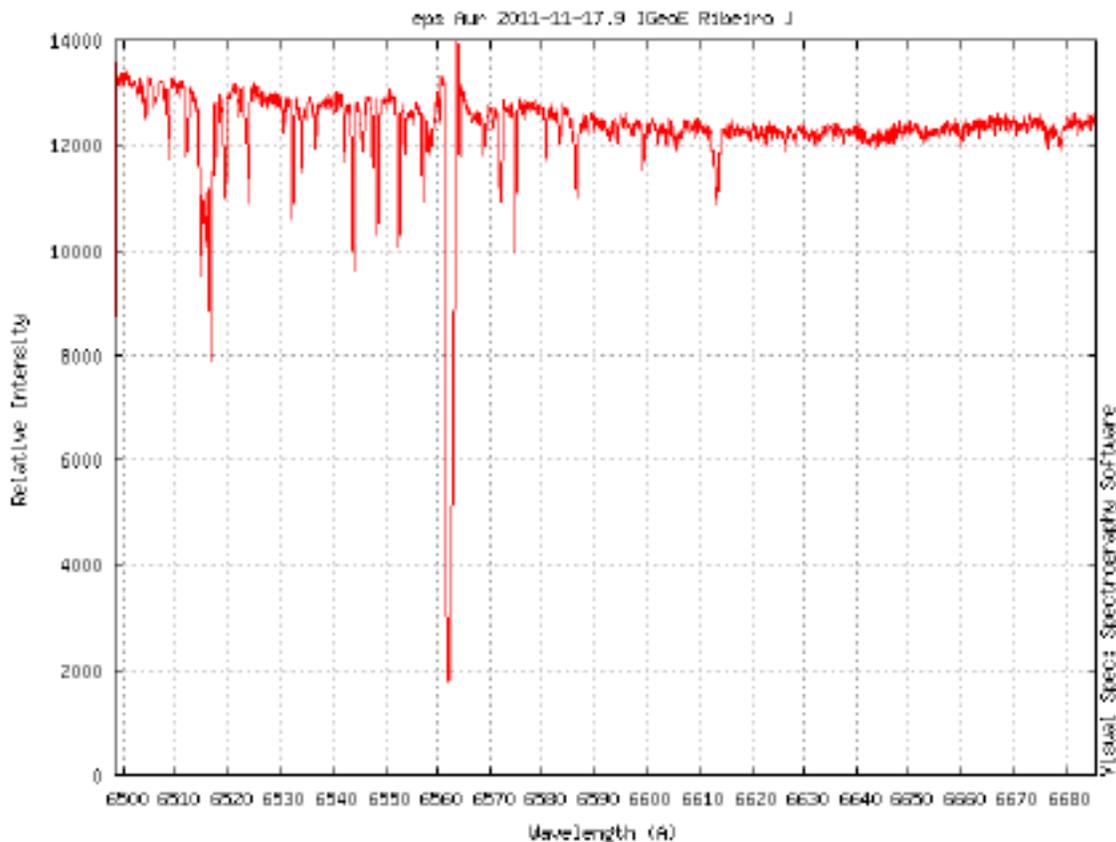
Further information for observers wanting to contribute spectra or researchers wishing to use the data can be found here on the main campaign web site <http://www.hposoft.com/EAuro9/Robin.html>

| JD (2400000+) | DATE | TIME (UT) | WAVELENGTH | | RANGE (A) | DISP (A/pixel) | OBSERVER |
|------------------|-----------|--------------|--------------|------------|--------------|-------------------|------------|
| | | | START (A) | END (A) | | | |
| 55898.263 | 02-Dec-11 | 18:19 | 4265 | 7335 | 3070 | | Garrel |
| 55897.421 | 01-Dec-11 | 22:06 | 7675 | 7720 | 45 | 0.1 | Leadbeater |
| 55893.374 | 27-Nov-11 | 20:58 | 7675 | 7720 | 45 | 0.1 | Leadbeater |
| 55891.341 | 25-Nov-11 | 20:11 | 7675 | 7720 | 45 | 0.1 | Leadbeater |
| 55889.367 | 23-Nov-11 | 20:48 | 4265 | 7335 | 3070 | | Garrel |
| 55888.287 | 22-Nov-11 | 18:53 | 7675 | 7720 | 45 | 0.1 | Leadbeater |
| 55885.564 | 20-Nov-11 | 01:32 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55884.291 | 18-Nov-11 | 18:59 | 3860 | 7420 | 3560 | 0.63 | Garde |
| 55883.323 | 17-Nov-11 | 19:45 | 6500 | 6685 | 185 | 0.09 | Ribeiro |
| 55882.307 | 16-Nov-11 | 19:22 | 4265 | 7335 | 3070 | | Garrel |
| 55881.351 | 15-Nov-11 | 20:26 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55879.390 | 13-Nov-11 | 21:21 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55878.442 | 12-Nov-11 | 22:36 | 5860 | 5950 | 90 | 0.12 | Leadbeater |
| 55878.392 | 12-Nov-11 | 21:25 | 6535 | 6605 | 70 | 0.1 | Leadbeater |
| 55877.628 | 12-Nov-11 | 03:05 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55876.489 | 10-Nov-11 | 23:44 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55872.421 | 06-Nov-11 | 22:06 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55871.412 | 05-Nov-11 | 21:53 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55867.537 | 02-Nov-11 | 00:53 | 5860 | 5950 | 90 | 0.12 | Leadbeater |
| 55867.428 | 01-Nov-11 | 22:16 | 6535 | 6590 | 55 | 0.1 | Leadbeater |
| 55867.326 | 01-Nov-11 | 19:50 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55860.308 | 25-Oct-11 | 19:24 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55856.448 | 21-Oct-11 | 22:45 | 4265 | 7335 | 3070 | | Garrel |
| 55854.405 | 19-Oct-11 | 21:43 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55853.533 | 19-Oct-11 | 00:48 | 5865 | 5960 | 95 | 0.12 | Leadbeater |
| 55853.416 | 18-Oct-11 | 21:59 | 6525 | 6605 | 80 | 0.1 | Leadbeater |
| 55851.401 | 16-Oct-11 | 21:37 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55851.393 | 16-Oct-11 | 21:26 | 6461 | 6685 | 224 | 0.07 | Desnoux |
| 55844.771 | 10-Oct-11 | 06:30 | 5800 | 5995 | 195 | 0.13 | Gorodenski |
| 55844.415 | 09-Oct-11 | 21:57 | 4265 | 7335 | 3070 | | Garrel |
| 55842.389 | 07-Oct-11 | 21:20 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55841.462 | 06-Oct-11 | 23:05 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55840.477 | 05-Oct-11 | 23:27 | 4285 | 7115 | 2830 | 0.1 | Buil |
| 55838.465 | 03-Oct-11 | 23:10 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55835.497 | 30-Sep-11 | 23:56 | 6461 | 6685 | 224 | 0.07 | Desnoux |
| 55833.476 | 28-Sep-11 | 23:26 | 5860 | 5945 | 85 | 0.12 | Leadbeater |
| 55833.439 | 28-Sep-11 | 22:32 | 6520 | 6600 | 80 | 0.1 | Leadbeater |
| 55832.469 | 27-Sep-11 | 23:16 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55830.496 | 25-Sep-11 | 23:54 | 4285 | 7115 | 2830 | 0.1 | Buil |
| 55829.512 | 25-Sep-11 | 00:17 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55828.537 | 24-Sep-11 | 00:53 | 4265 | 7335 | 3070 | | Garrel |
| 55825.484 | 20-Sep-11 | 23:37 | 7675 | 7720 | 45 | 0.13 | Leadbeater |

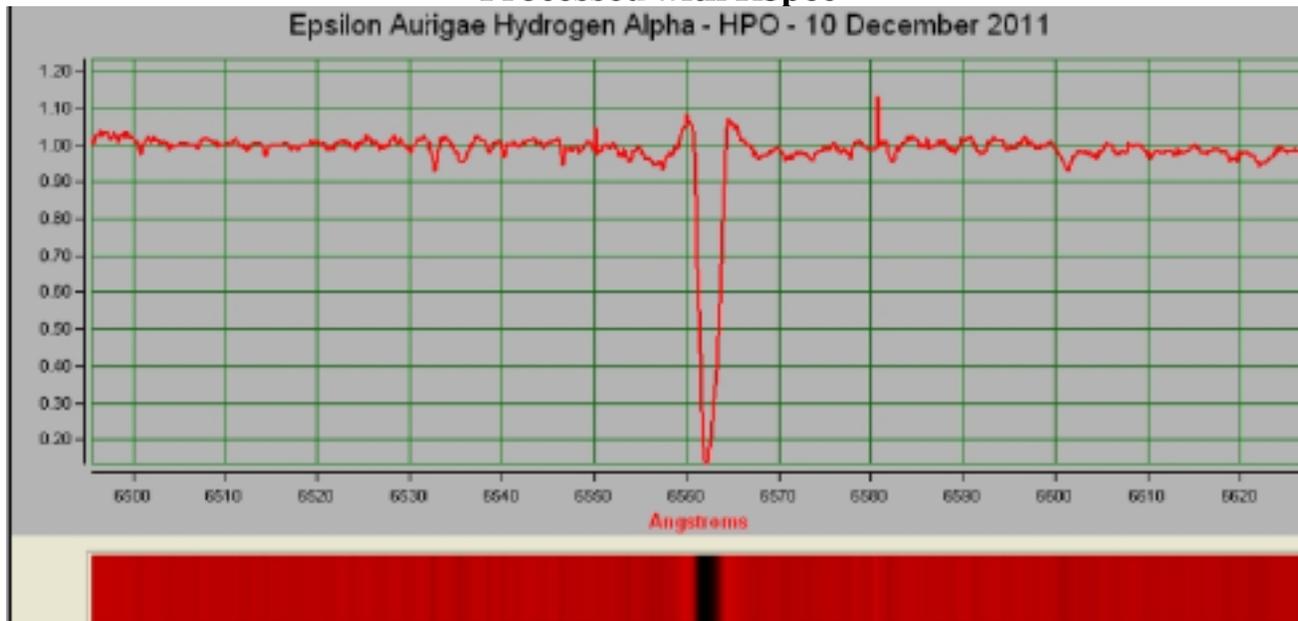
| JD (2400000+) | DATE | WAVELENGTH | | | DISP (A/pixel) | OBSERVER | |
|------------------|-----------|--------------|--------------|------------|-------------------|----------|--------------|
| | | TIME (UT) | START (A) | END (A) | | | RANGE (A) |
| 55820.454 | 15-Sep-11 | 22:54 | 6525 | 6606 | 81 | 0.11 | Leadbeater |
| 55823.430 | 18-Sep-11 | 22:19 | 6530 | 6690 | 160 | 0.12 | Mauclaire |
| 55822.813 | 18-Sep-11 | 07:31 | 5800 | 5995 | 195 | 0.13 | Gorodenski |
| 55821.444 | 16-Sep-11 | 22:40 | 4265 | 7335 | 3070 | | Garrel |
| 55819.485 | 14-Sep-11 | 23:39 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55819.453 | 14-Sep-11 | 22:53 | 6496 | 6608 | 112 | 0.04 | Charbonnel |
| 55817.539 | 13-Sep-11 | 00:56 | 4285 | 7115 | 2830 | 0.1 | Buil |
| 55815.539 | 11-Sep-11 | 00:56 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55814.722 | 10-Sep-11 | 05:19 | 6525 | 6600 | 75 | 0.2 | Lailly |
| 55813.507 | 09-Sep-11 | 00:10 | 4285 | 7115 | 2830 | 0.1 | Buil |
| 55811.551 | 07-Sep-11 | 01:14 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55809.526 | 05-Sep-11 | 00:38 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55803.865 | 30-Aug-11 | 08:46 | 5798 | 5990 | 192 | 0.13 | Gorodenski |
| 55801.623 | 28-Aug-11 | 02:57 | 4285 | 7115 | 2830 | 0.1 | Buil |
| 55801.533 | 28-Aug-11 | 00:48 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55801.458 | 27-Aug-11 | 23:00 | 4265 | 7335 | 3070 | | Garrel |
| 55795.561 | 22-Aug-11 | 01:28 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55791.586 | 18-Aug-11 | 02:04 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55790.551 | 17-Aug-11 | 01:14 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55790.515 | 17-Aug-11 | 00:21 | 4265 | 7335 | 3070 | | Garrel |
| 55789.876 | 16-Aug-11 | 09:02 | 5798 | 5990 | 192 | 0.13 | Gorodenski |
| 55788.564 | 15-Aug-11 | 01:32 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55782.573 | 09-Aug-11 | 01:45 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55779.609 | 06-Aug-11 | 02:37 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55779.547 | 06-Aug-11 | 01:07 | 4280 | 6950 | 2670 | 0.1 | Thizy |
| 55778.592 | 05-Aug-11 | 02:12 | 4280 | 6950 | 2670 | 0.1 | Thizy |
| 55776.559 | 03-Aug-11 | 01:25 | 7675 | 7720 | 45 | 0.13 | Leadbeater |
| 55773.592 | 31-Jul-11 | 02:12 | 6495 | 6608 | 113 | 0.1 | Desnoux |

Some Recent Epsilon Aurigae Spectra

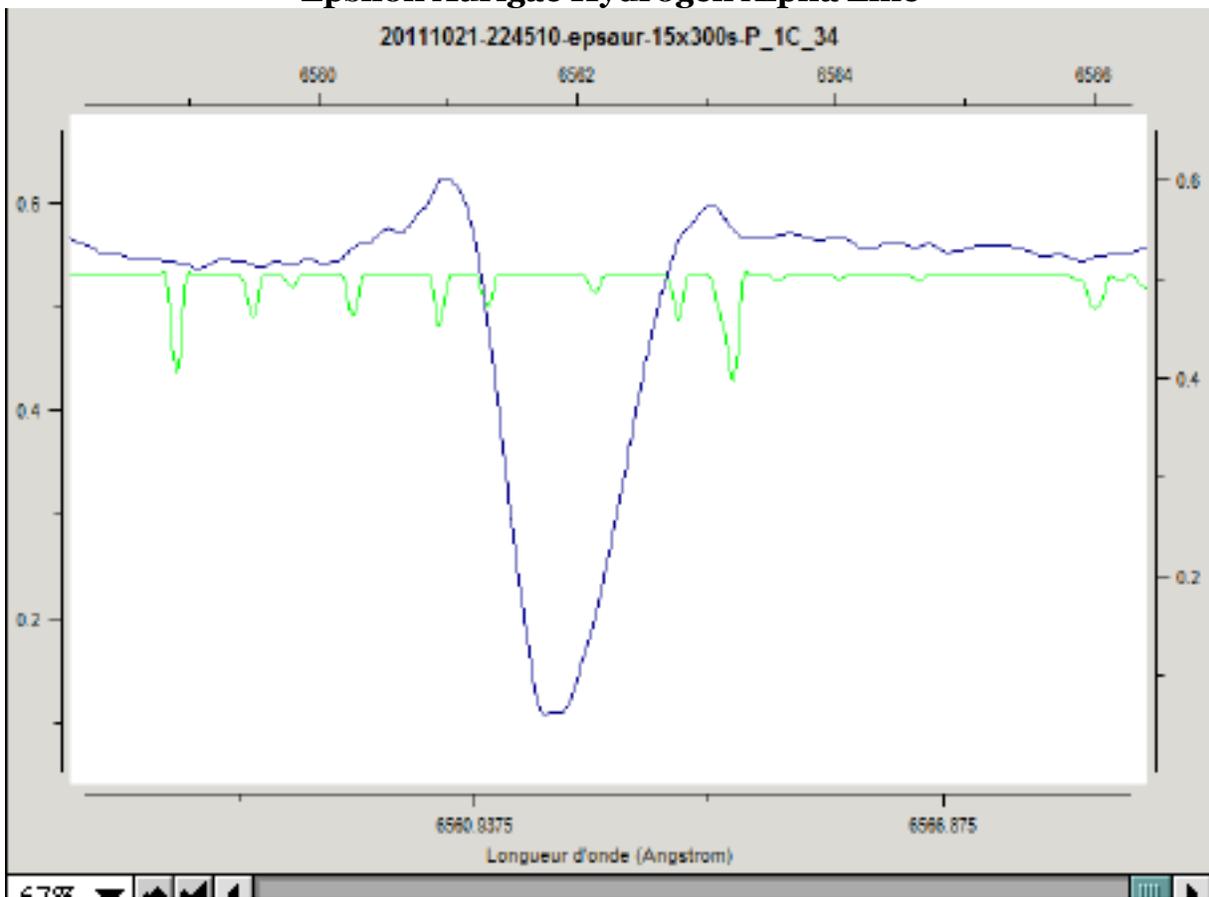
Jose Ribeiro 17 November 2011



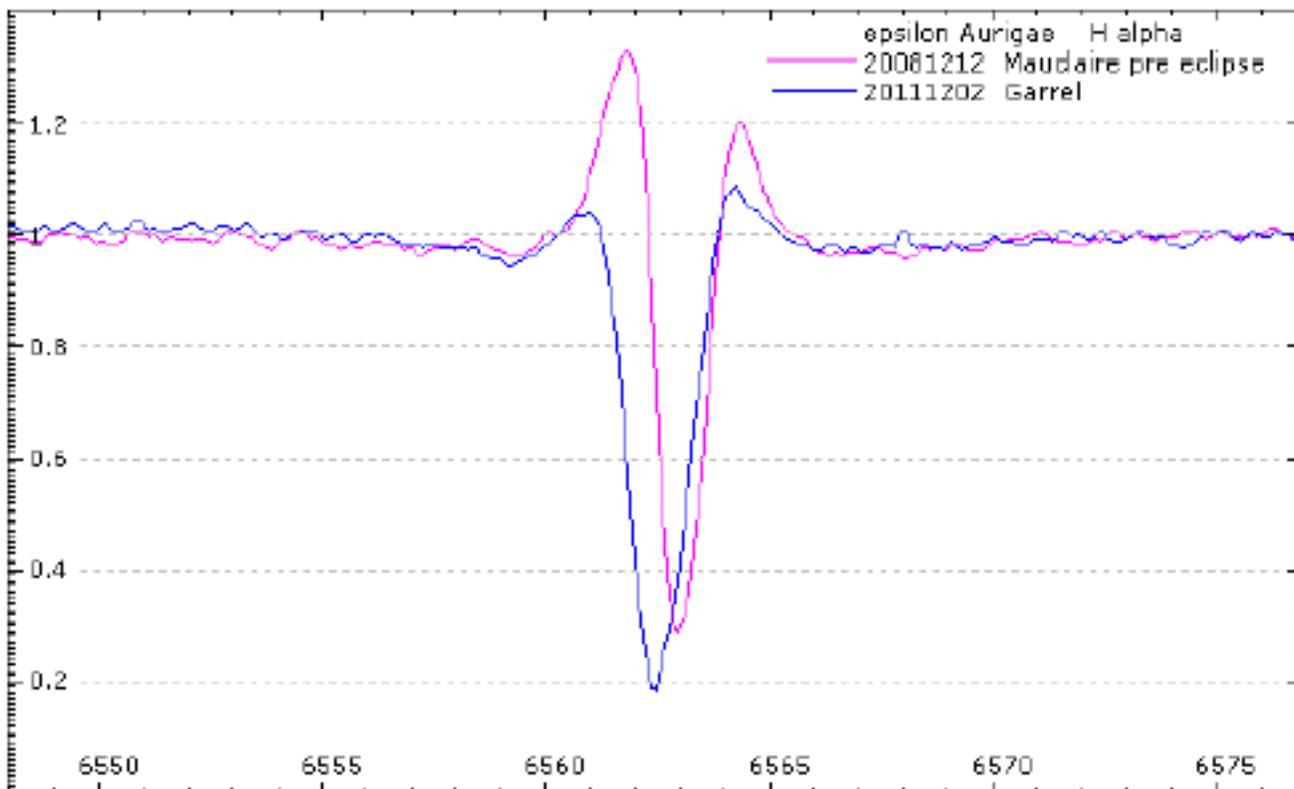
Hopkins Phoenix Observatory 10 December 2011
Epsilon Aurigae Hydrogen Alpha Line
Processed with RSpec



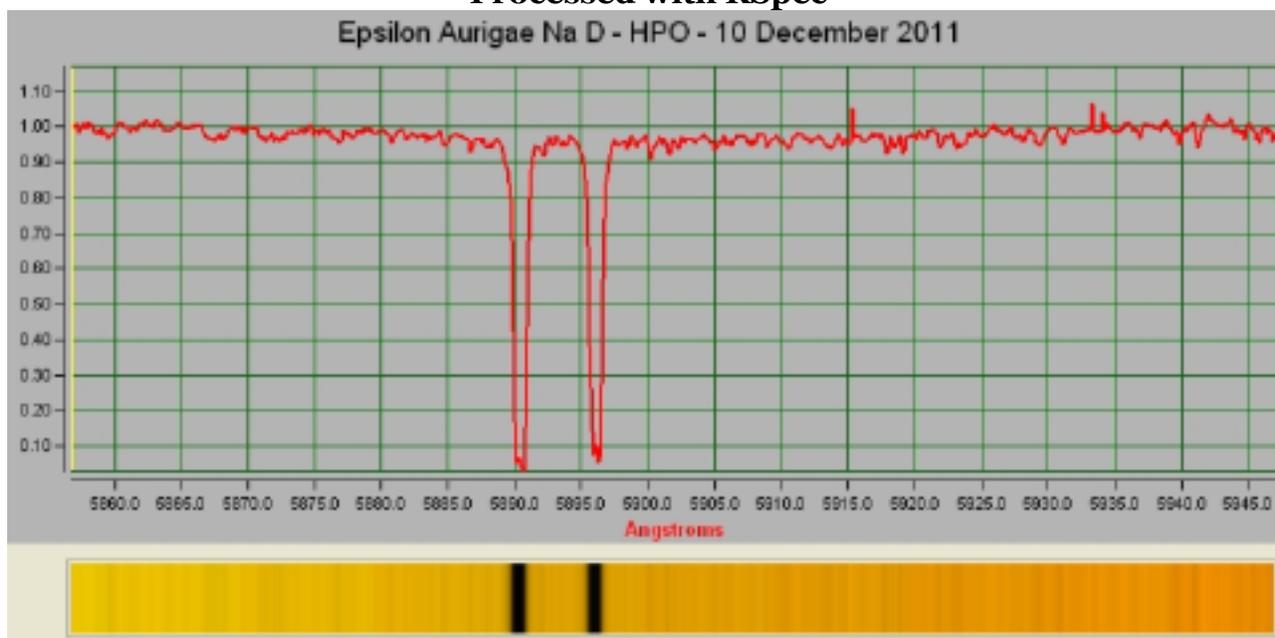
Thierry Garrel 21 October 2011
Epsilon Aurigae Hydrogen Alpha Line



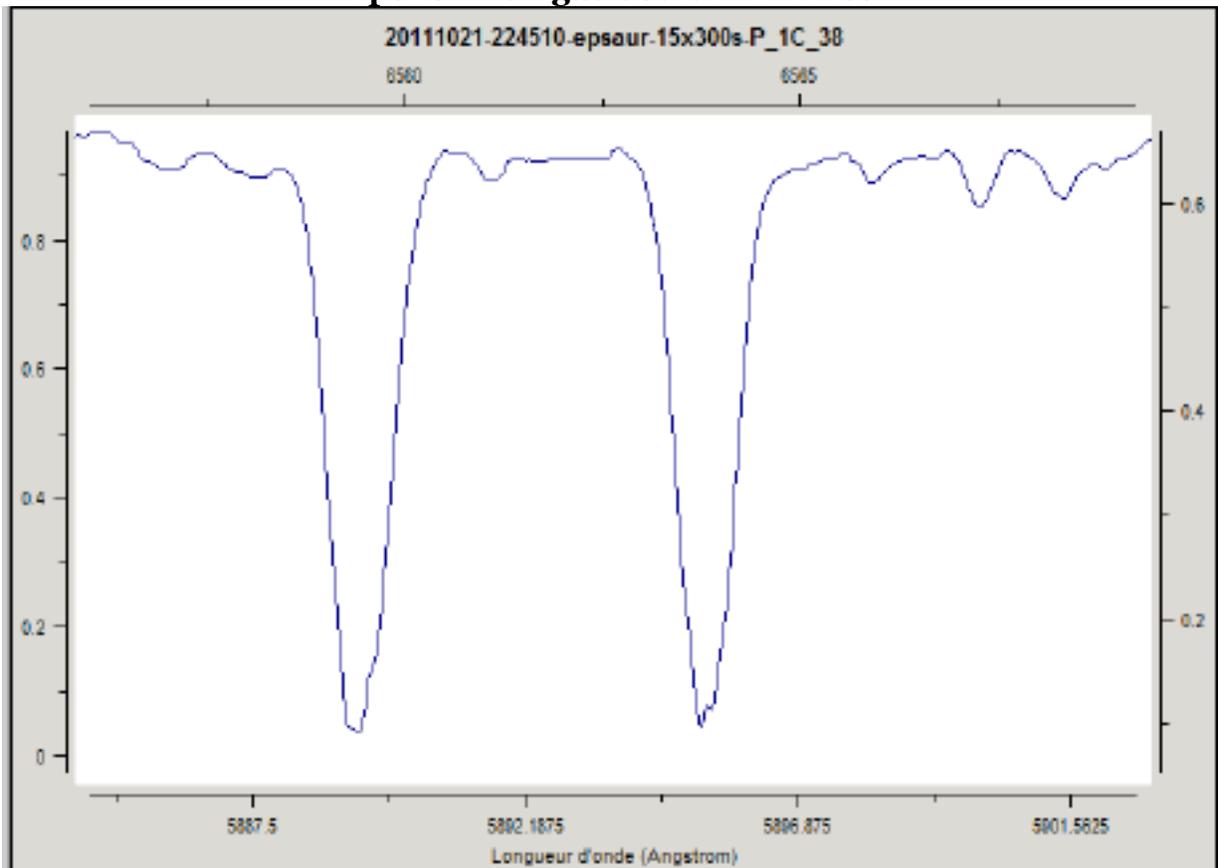
Although the blue edge emission component has now returned, there still appears to be an excess absorption on the blue side of the central absorption region compared with typical pre eclipse spectra, possibly due to the continued presence of the eclipsing disc, though the inherent variability of this at all phases makes it difficult to be certain.



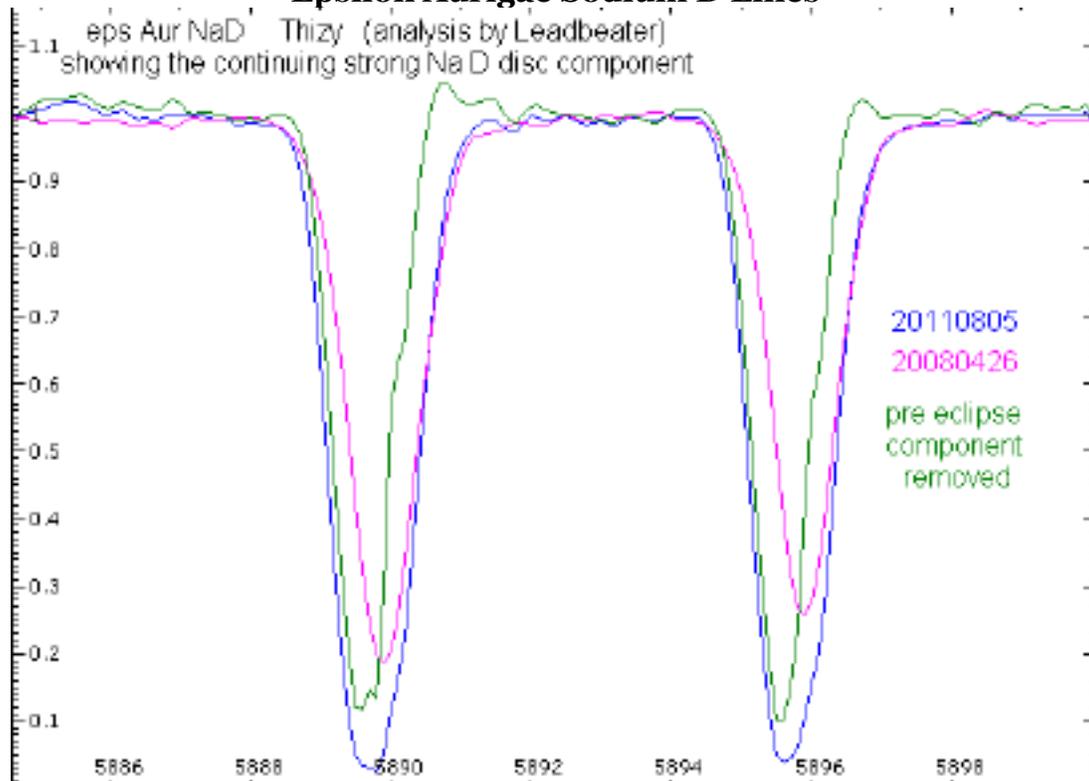
**Hopkins Phoenix Observatory 10 December 2011
Epsilon Aurigae Sodium D Lines
Processed with RSpec**



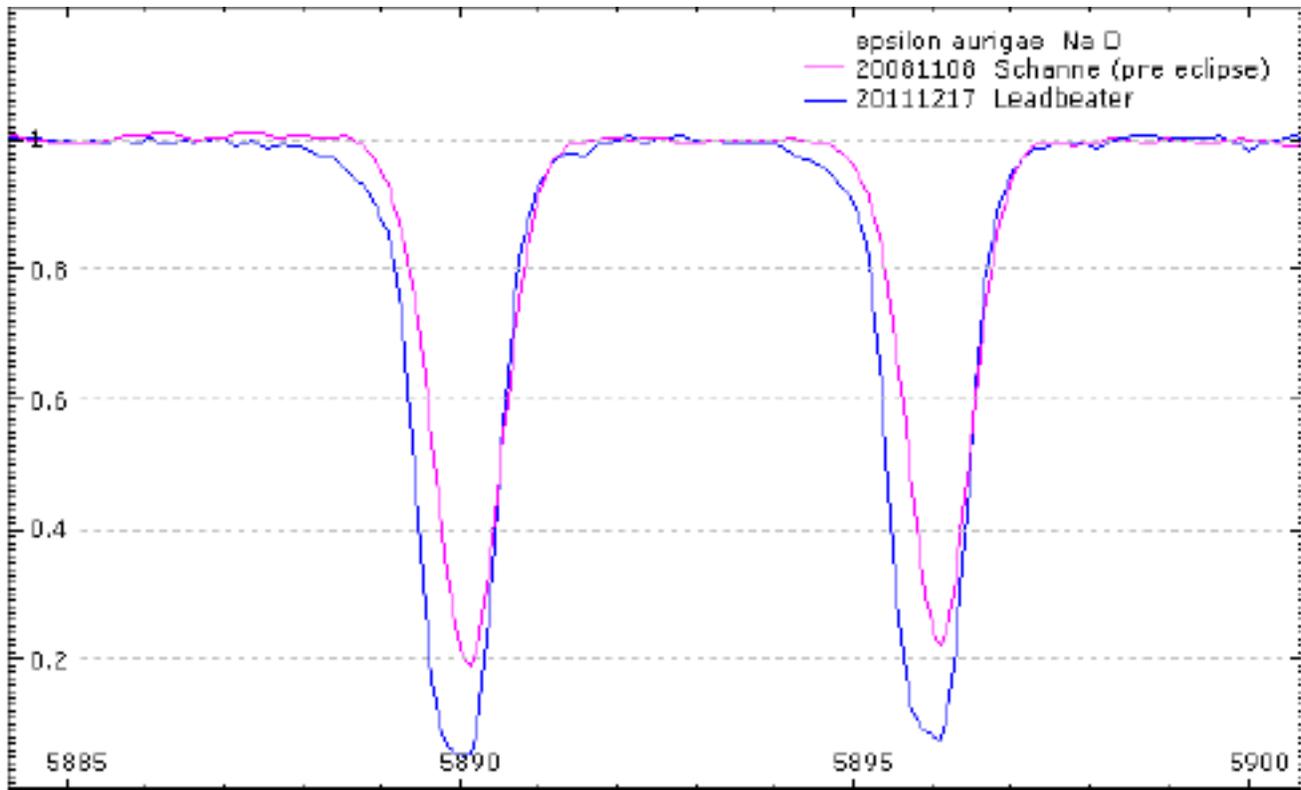
Thierry Garrel 21 October 2011
Epsilon Aurigae Sodium D Lines



Olivier Thizy
Epsilon Aurigae Sodium D Lines

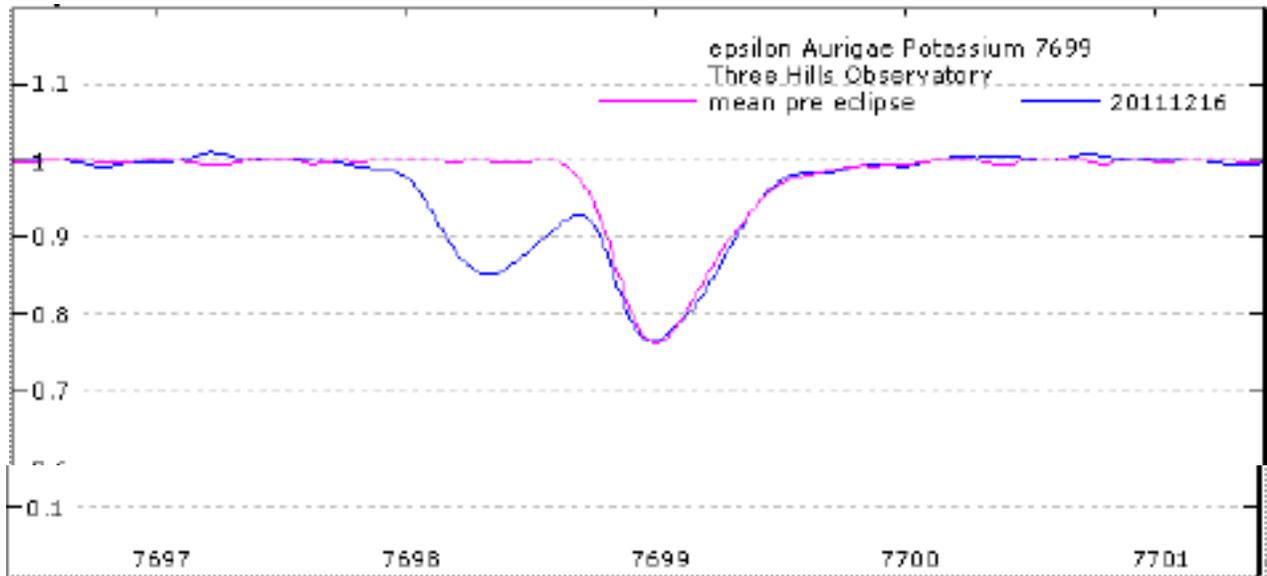


Although we are now several months after photometric 4th contact, absorption due to eclipsing object remains strong in the Na D lines, with a significant blue shifted component blended with the outside eclipse component.

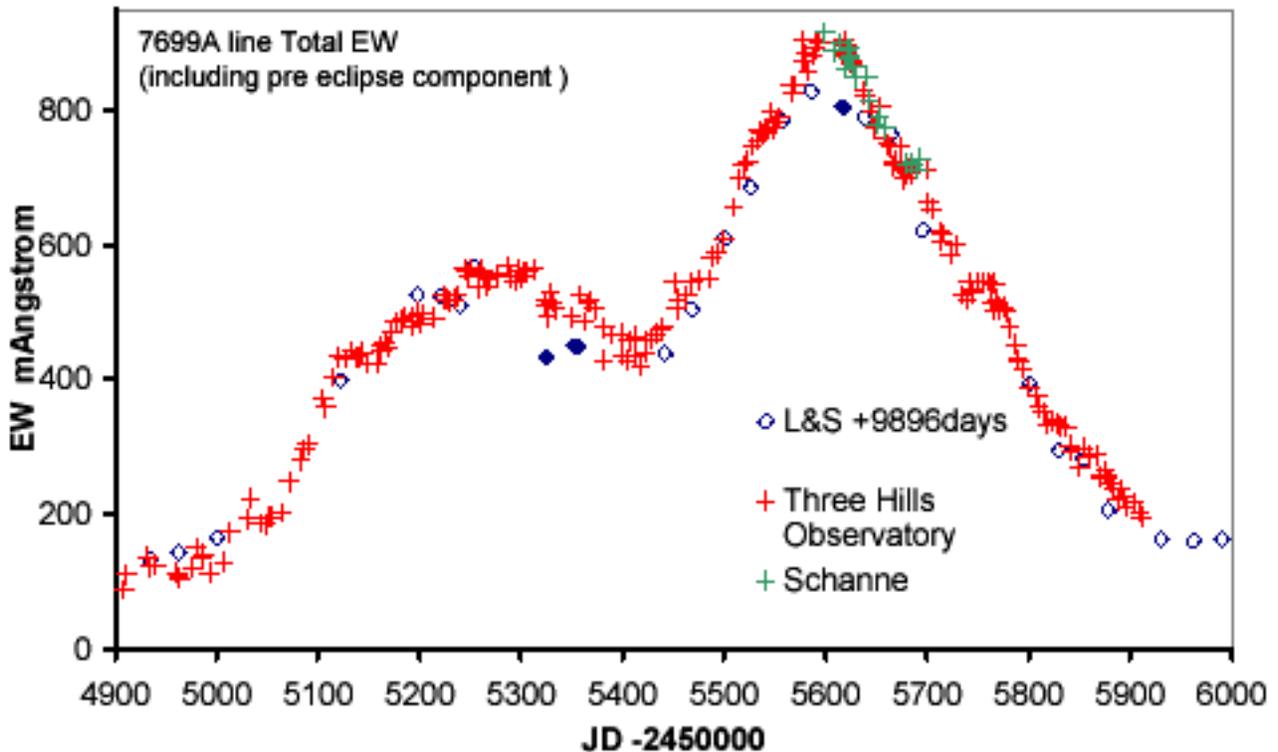


The 7699A Potassium line

The contribution to the 7699A Potassium line from the eclipsing disk is still obvious currently.



The total Equivalent Width (EW) has continued to decrease overall but with several pauses. Extrapolation suggests that the eclipsing disk component may disappear around the middle of January 2012



Cheers
Robin

From Dr. Bob

What a wonderful set of results, with many many thanks due to all the observers participating in this campaign! For the record, the earliest account I could find of these past campaigns that led to Jeff Hopkins' involvement, is the abstract by Genet and Stencel for the 1981 AAS meeting: BAAS 13: 804, "A Coordinated Ultraviolet-Optical-Infrared Observing Campaign for the 1982-84 Eclipse of Epsilon Aurigae."

<http://adsabs.harvard.edu/full/1981BAAS...13..804G>

I salute Jeff Hopkins for his persistent and heroic efforts with the photometry, as well as with the production of both series of Newsletters (current and 1982- 85). As Jeff and I might not be around for the next eclipse, we have to entrust the knowledge base to the younger generation, and thus have designated Brian Kloppenborg as the curator. Brian's dissertation work should help resolve some of the outstanding problems still remaining with human understanding of epsilon Aurigae.

TEN THINGS WE'VE LEARNED AS A RESULT OF THESE CAMPAIGNS -

some of these were recognized last time around, and some represent working hypotheses that serve as tools to design more clever measurements and theory to finally resolve the masses and evolutionary status of epsilon Aurigae components:

FACT: the eclipsing object is a large, 550K disk [IR], the core of which eclipses the southern hemisphere of the F star [CHARA+MIRC];

FACT/INTERPRETATION: neutral potassium line strength monitoring [7699A; LHIRES] - revealed disk substructure;

FACT: carbon monoxide absorption lines re-appeared again at 2.3 microns, after mid-eclipse [SpeX, GNIRS];

NEW FACT: He I 10830A absorption strengthened after mid-eclipse [SpeX] - indicating a hot source near/at disk center;

FACT: the disk facing the F star is heated to ~1100K [IR];

FACT: the Far-UV output is somewhat eclipsed [HST/COS];

FACT: no 10 micron silicates detected [BASS, MIRAC] - INTERPRETATION: large particles (greater than 1 micron size) dominate the thick disk;

FACT/INTERPRETATION: light curves feature ~0.1 magnitude variations - F star oscillations, wind.

SUSPECTED: the disk may contain a B5V star;

SUSPECTED: the mass ratio favors the B star as the more massive object.

Some of these new and old facts lead me to the following considerations. One can compute the equilibrium temperature of an object orbiting a star.

See:

<http://burro.cwru.edu/Academics/Astr221/SolarSys/equiltemp.html>

In a blackbody approximation, for a 30,000 solar luminosity primary star, we find that the observed heated face of the disk, 1100K, is reached at a separation of 9 to 11 AU for a range of particle albedos from 0.3 (somewhat reflecting) to zero (fully absorbing). Given that the F star luminosity estimate increases with larger distances, this separation result is not definitive, but these thermal IR facts provide another constraint on binary separation (hence, total mass). Another interesting constraint on the mass of the central star inside the disk, can be derived from the velocity shift seen in Robin Leadbeater's neutral potassium line data, approximately +/- 35 km/sec rotation speed, plus a current best guess for the radius of the disk itself, 3.81 AU. With an implied disk rotation period of 3.25 years, Kepler's third law then tells us the central mass is 5.25 solar masses - essentially the 6 solar mass B5V star proposed earlier. As this newsletter series draws to a close, I'll start updating my web page,

<http://www.du.edu/~rstencil/epsaur.htm>

with interesting developments for all interested parties.

Thus, although the recent eclipse is fading into memory, the bonanza of data is providing researchers both ample constraints for checking the current model, and inspiration for how to design observations that can confirm ideas without waiting another 27 years for the next eclipse. Key among the goals in these studies is pinpointing the disk's age and evolutionary state, and whether there might be high levels of activity such as the B star's accretion of disk matter. The F star itself is an important part of the study: Does it have an active atmosphere or giant convective cells, flares, or even a strong stellar wind? The next eclipse is forecast to start in 2036, but you can enjoy out-of-eclipse variations of Epsilon Aurigae's light the very next time you see the star, along with Capella and the Kids riding across the evening sky. Post-eclipse observations are still needed — this star retains its capacity to surprise. Thanks again for your interest and participation in this campaign, and keep in touch!

--Dr. Bob Stencil, University of Denver Astronomy, rstencil@du.edu



Dr. Robert E. Stencil . Co- Editor
University of Denver Astronomy Program
<robert.stencil@du.edu>

Meeting Announcement

Dr. Bob says there will be at least one special session on epsilon Aurigae.

XIth HVAR ASTROPHYSICAL COLLOQUIUM The Most Mysterious Binaries: Significance for Astrophysics

Hvar, Croatia
2 - 6 July 2012

For further information, see <http://www.geof.unizg.hr/oh/index.html>.

Interesting Papers

Interesting new papers since last newsletter:

At least these two items, with several papers in preparation for the electronic Journal of the AAVSO
(March 2012 deadline)

Infrared Studies of epsilon Aurigae in Eclipse

<http://adsabs.harvard.edu/abs/2011AJ....142..174S> =, R.Stencel et al.
2011 (Nov) Astronomical Journal, text available at

<https://portfolio.du.edu/pc/port.detail?id=194959>

Synthetic spectra and light curves

<http://adsabs.harvard.edu/abs/2011arXiv1108.2975B> =, J. Budaj,
to appear in the Proceedings: From Interacting Binaries to Exoplanets: Essential
Modeling Tools, IAU Symposium 282.

Closing Note

This has been a most remarkable Campaign. I think what has impressed me most is the spectroscopic contribution. There are several observers worth noting that I consider much more professional than amateur, spectroscopic observers like Buil, Ribeiro, Garrel, Thizy and Desnoux have proven professional spectroscopy is not limited to major observatories.

While the AAVSO is expanding its automated telescopes as well as automated bright star observing, I think there is still a big future for individuals doing spectroscopy. While it is certainly possible to automate spectroscopy, it is nowhere as easy as automating photometry. As such, those interested in spectroscopy can get started with just an inexpensive low resolution spectrograph such as the Star Analyser of Rainbow Optics units. There can even be used on just a DSLR with tripod. There is much that can be done with this simple setup and a great deal to be learned. Software such as RSpec now makes spectral processing easy and fun. For the more advanced observer and at a significantly higher price the LISA or Lhires III spectrographs provide medium and high resolution capability. The high resolution work is where the challenge exists and real science can be done.

This Campaign has been both fun and a challenge. For future photometric campaigns I will probably be an armchair observer. I plan on continuing my spectroscopic work, however.

It has been an honor working with all those of you who have contributed to the success of the Campaign.

Thank You!

Clear Skies!



Jeff

Jeffrey L. Hopkins
Newsletter Editor
Hopkins Phoenix Observatory
(187283)*
7812 West Clayton Drive
Phoenix . Arizona 85033 USA
phxjeff@hposoft.com

* See: <http://www.minorplanetcenter.net/iau/MPEph/MPEph.html>