

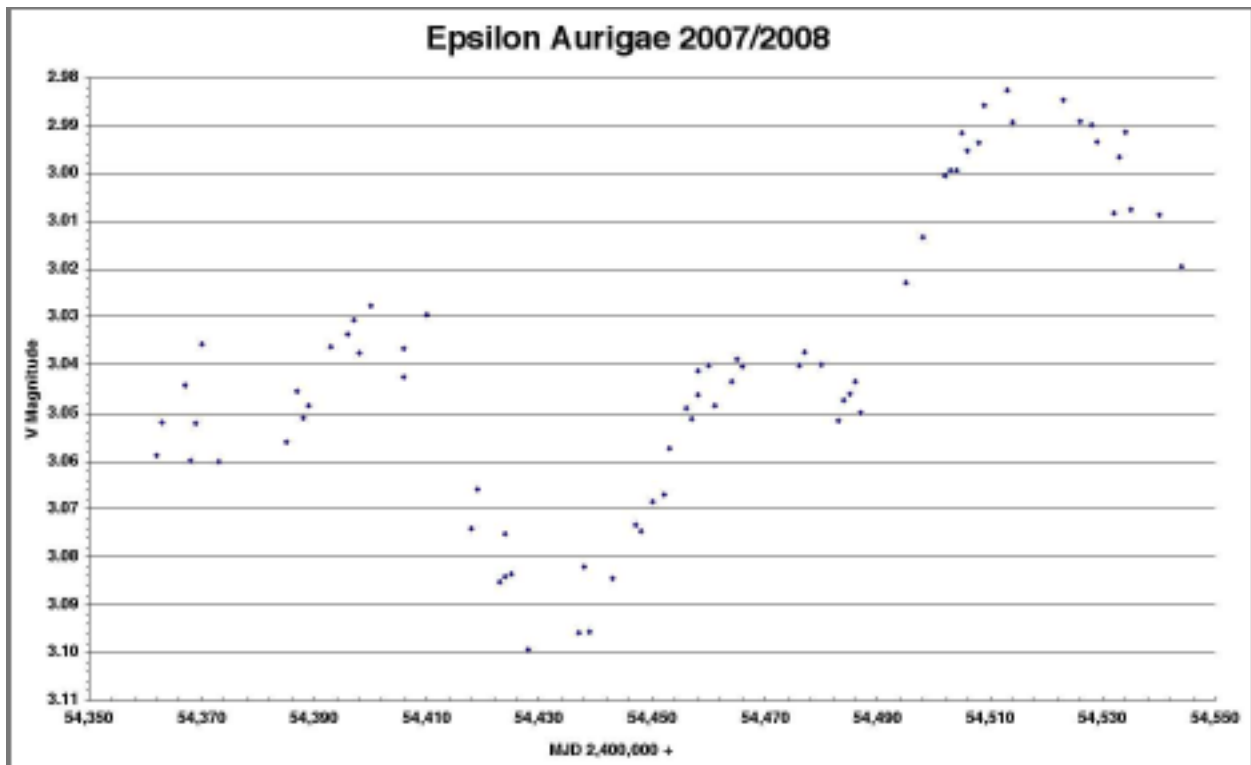
2009 Epsilon Aurigae Eclipse Campaign Newsletter #5 Spring 2008

Dear Colleagues,

The current observing season for epsilon Aurigae is fading fast. While those in higher latitudes will have a bit longer season and even possible year around observing, this time of year and early summer provides a big challenge for most observers as the star system is close to the horizon after sunset and will not rise before sunrise. This may be the last Newsletter of the season unless significant additional information is received between now and fall of this year. If possible, summer observations during July and August are encouraged if nothing more than a test for when the eclipse starts in the summer of 2009.

Hopkins Phoenix Observatory (HPO) Data

This amazing star system continues to be surprising. The following is light curve from HPO V data for the 2007/2008 season.



A paper will be presented on epsilon Aurigae at the end of May at the Society for Astronomical Sciences (SAS) meeting in Big Bear Lake, California.

The paper is:

Gearing Up for Epsilon Aurigae's First Eclipse of the Millennium

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ABSTRACT

The mysterious 3rd magnitude long period eclipsing binary star system epsilon Aurigae is predicted to be starting its 2 year eclipse in the late summer of 2009. While this is when the real excitement starts much is too be learned before first contact. This paper will discuss current observational results that have accumulated data using photometry, spectroscopy and other data sources. While the system is ideal for single channel photometry, due to the system brightness and distant comparison star, CCD photometry presents some interesting challenges. A fairly simple way for amateur astronomers to do BVRI CCD photometry of the system using a 50 mm camera lens and a DSI Pro camera is discussed.

**News and data from our colleagues
(in order of receipt)**

From: "l.schanne" <l.schanne@arcor.de>
Subject: spectra database eps Aur
Date: Wed, 20 Feb 2008 16:12:41 -0700

You can find my recent spectra of eps Aur in our database
<<http://stahl.homelinux.org:8000/otmar/specdb/>><http://stahl.homelinux.org:8000/otmar/specdb/>

Bob, Jeff, it's no problem, you can post this URL on the campaign web site. I'll put my spectra continuously in this database. So you are able to get this spectra all time.

best wishes from the old world
Lothar

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Schanne Spectroscopy Equipment



Schanne Observatory

From: "Robin Leadbeater" <robin@leadbeaterhome.fsnet.co.uk>
Subject: Re: Eps Aur LHIRES III 2400
Date: Tue, 26 Feb 2008 16:06:42 -0700

It is a Vixen VC200L (a 200mm f9 Cassegrain) You can see the setup here, though I am now using a cooled 16bit ATK16IC camera and the modified web cam has been demoted to guider duty.

http://mysite.wanadoo-members.co.uk/astro2/spectroscopy_6.htm

It is all sited in an "observatory" now as well which is gradually becoming more automated

<http://mysite.wanadoo-members.co.uk/astro2a/observatory/observatory.htm>

Cumulative exposures were typically 60min. S/N is around 200 (Note the versions posted are corrected for instrument response but not rectified using a continuum fit.) They were wavelength calibrated to an accuracy of about $\pm 0.05\text{\AA}$ using atmospheric lines but a pro reduction pipeline might well get tighter than this using the raw spectra.

If you can advise on the best observations to make I am at your disposal subject to the rather poor weather conditions in this part of the world of course! (BTW I am also in touch with Lothar Schanne via the VdS spectroscopy group)

Cheers
Robin

From: "l.schanne" <l.schanne@arcor.de>
Subject: eps Aur: important preliminary results
Date: Thu, 28 Feb 2008 03:51:19 -0700

In the annex a important preliminary result:

The graph shows the equivalent widths of the Ha line emission wings and absorption core and the Doppler shifts (heliocentric radial velocities, RV) of the line center of the absorption core (the deviation bars of the RV are the standard deviations, calculated using the differences of measured wavelength and lab wavelength of 3 terrestrial waterlines). There is a strong parallelity of the EW of the absorption component and the RV !!!

The spectrum and the RV are roughly constant during the last 20 days (tally with the photometric results of Jeff).

The absorption core is "moving" through the emission peak. That explains the "V/R"-like variability of the Ha line profile

<http://spektroskopie.fgvds.de/forum/viewtopic.php?t=2329>

<http://spektroskopie.fg-vds.de/forum/viewtopic.php?t=2329>).

The preliminary results support the model of a emitting and absorbing variable ring/disk/shell around the F-star.

The next days I plan to do:

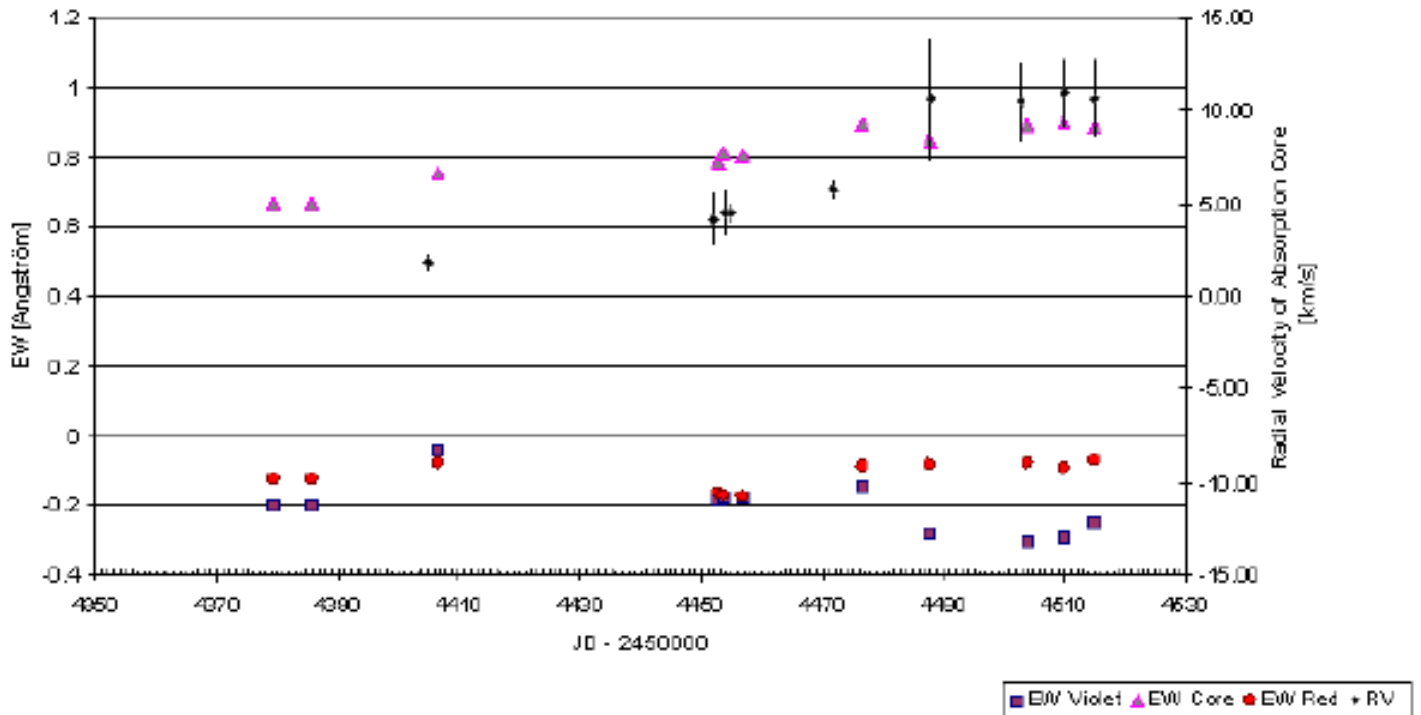
1. Exploitation of the RV of some metal lines and comparing with the Ha behaviour
2. Calculation of the RV-curve of the primary using the orbital elements and comparing with the measured RV's >>> relative velocities of the absorbing gas masses to the star

If this activities support the results I'm thinking about a publication in IBVS. Bob, what do you think about that? The weather is now very bad in Germany so I'm not able to observe eps Aur in the next days.

ByeLothar

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Time series of Equivalent Widths of the Emission Wings and Absorption Core and Radial Velocity of the H α Line of eps Aur



From: "RICHARD MILES" <rmiles.btee@btinternet.com>
Subject: Re: [Aavso-photometry] Epsilon Aurigae Notice
Date: Thu, 28 Feb 2008 15:06:27 -0700

You are doing just great on epsilon Aurigae ahead of the eclipse - Do keep it up. I shall have to start serious observation - next clear night I promise.

I have made one observation of the star in 2007 on July 31 in the daytime when the Sun was 38 degrees above the horizon. I ought to report this measure to the AAVSO. The observation was:

Eps Aur
2007 July 31 08:40 UT V=3.02 +/- 0.05

Not very accurate I know but it was daytime and I was only using 44mm aperture! I also measured Betelgeuse:

Alp Ori
2007 July 31 08:20 UT V=0.51 +/- 0.02

As I say I shall be able to contribute precise V and Ic photometry from now on made during the night-time.

Cheers,
Richard

Date: Thu, 28 Feb 2008 17:03:19 -0700

Yes - J- and H-band photometry in the day is a definite possibility for some.

Of course when in eclipse the star is considerably fainter and will be a more challenging target when at low solar elongation. Attached is a light curve of Beta Lyrae some points of which were taken before sunset and after sunrise. The technique is to place a 2% transmission neutral density filter in front of a small telescope objective and stack about 200 images to create a single image of high signal to noise. You then shift the scope a few arc minutes and take another set. One set serves as a perfect flat-field for the other set and vice versa. Last week in a photometric sky, I measured the planet Mercury when it was 19.9 degrees from the Sun at local noon obtaining $V = +0.813 \pm 0.016$.

Daytime observation of Eps Aur will require me to use Capella and Beta Tauri as comparison stars.

Around June 10, the Sun is closest to Eps Aur at around 21 degrees elongation. Unfortunately the solar glare in full daylight is too strong then. Also, my northern horizon is badly obscured. So I shall have to try and observe when the Sun is close to or just below the horizon in the evening at say 9-10 pm or between 4-5 am local time during the months of May-July inclusive.

For bright star photometry I have been defocusing the image - it has a negligible effect on the flat-field. However, recently I have obtained some new software which means I can get the camera to take say 100 images (windowed down to say 1/4 frame) average them all and save the result to a single frame/file. I can use exposure times down to 1 millisecond if needs be. So now I am planning on not defocusing.

Cheers,
Richard

From: Lindberg <gorlin@telia.com>
Subject: epsilon aur
Date: Thu, 28 Feb 2008 22:47:35 -0700

Well I think I am to bad for epsilon, last night I get:

EpsAur 20080228.7986 2.971 Filter Uv/ir block 3 star ref

EpsAur 20080228.7920 3.041 Filter Uv/ir-block 1 star ref.

I stacked 34 fits images, exp time 3 sec, for the result 2.971 I used 3 ref star:

6.20

4.71

3.19

And for result 3.041 I used only star 4.71 as ref

The original stacked fits image is in size 654 KB if you want to see it, I think I have to defocus a bit more.

Regards
h-g

From: "Makalii Observatory" <makalii45@q.com>
Subject: epsilon Aurigae
Date: Fri, 29 Feb 2008 16:08:14 -0700

I am submitting B and V data, obtained with my SSP-3/LX-200 10" system, to AAVSO using observer code FXJ. Do you want copies too? Two observing dates so far yielded the following:

JD 2454497.5569 B = 3.568, V = 2.948

JD 2454503.5500 B = 3.557, V = 2.940

I am also located in Minnesota, about 10 miles from Paul Bechmann. Unfortunately, trees to my NW will preclude following the star in its circumpolar path -- maybe Paul will have a better horizon.

Clear skies,
Jim Fox
Makalii Observatory



Makalii Observatory

From: "Brian McCandless" <bem@UDel.Edu>

Subject: Latest Data

Date: Mon, 3 Mar 2008 13:46:59 -0700

Here is my latest copy of the epsilon Aurigae spreadsheet, with observational errors added to the V and J and H band data. I also added all the spectral data I have taken so far. Since the star is so bright, I am dedicating my next time out to acquiring more spectra.

My procedure for determining observational +/- error on the photometry data is to transform the standard deviation of program and comparison star data to delta magnitude. For each filter magnitude estimate, I use the largest standard deviation as the error, since the determination is only as good as the worst piece of data.

At the telescope, each filter magnitude is bracketed by 2 comparison star magnitudes, and I take 3-4 readings for each of star and sky. On some occasions, the sky changes near the end of the run and I may have to throw away the last comparison star data and only use the set taken immediately prior to the program star. Very often I'll end up throwing away an hour's work because high cirrus and low fog have played games with me. This usually shows up in the comparison star and the sky data - I keep a running "fix" on the sky model for each filter. When such events occur I indicate them in my lab notebook and do not analyze or submit those results.

Best wishes,
Brian.

From: "Brian McCandless" <bem@UDel.Edu>

Subject: Latest data

Date: Fri, 21 Mar 2008 20:00:20 -0700

Hope all is well. Here is my spreadsheet - the maximum appears to be over, and I can't wait to do J and H band to see what is the phase difference. For my V measurements, I am adding HD32655 as the check star since it is so close by and has a close spectral match. I will add this eventually to the spreadsheet as a new column.

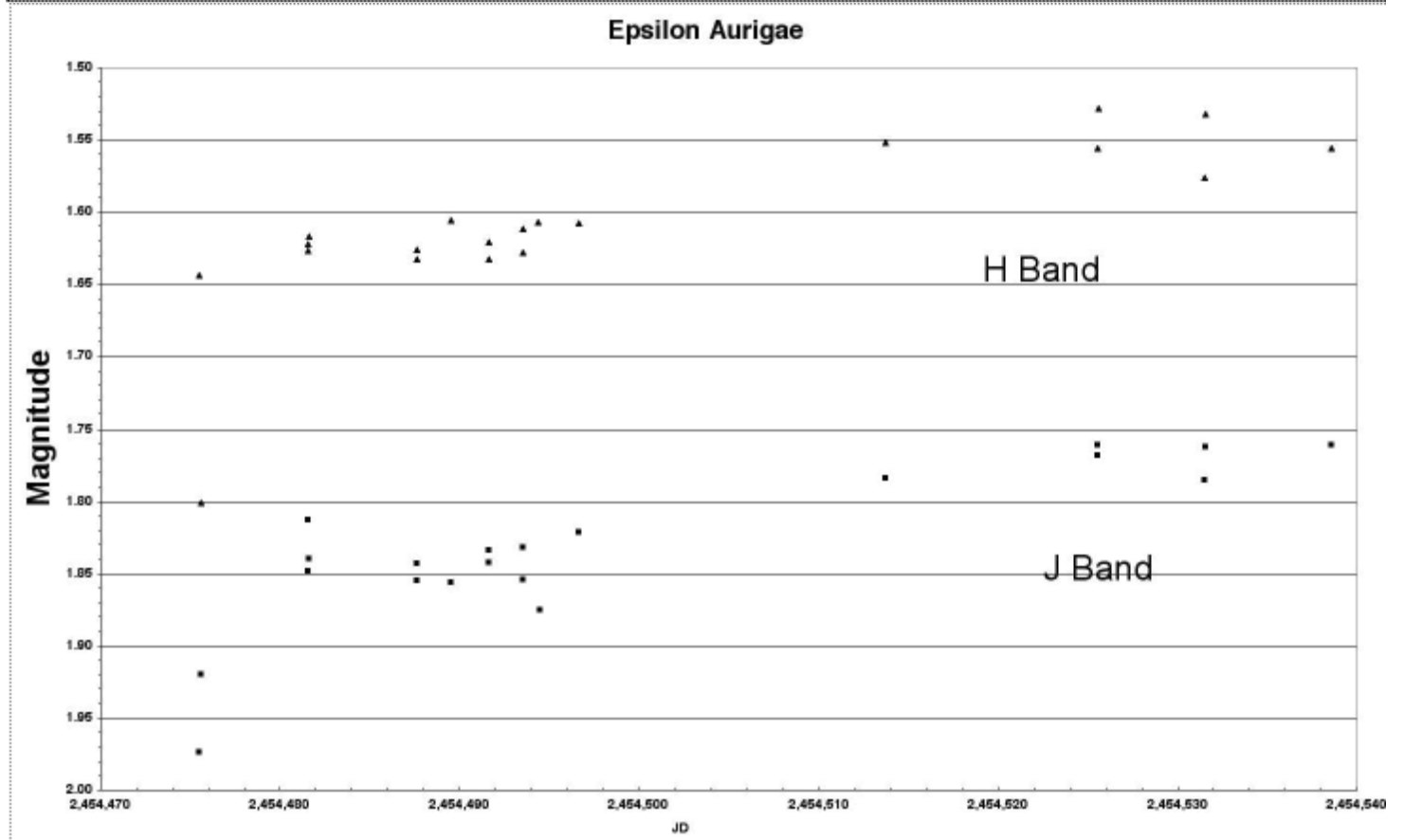
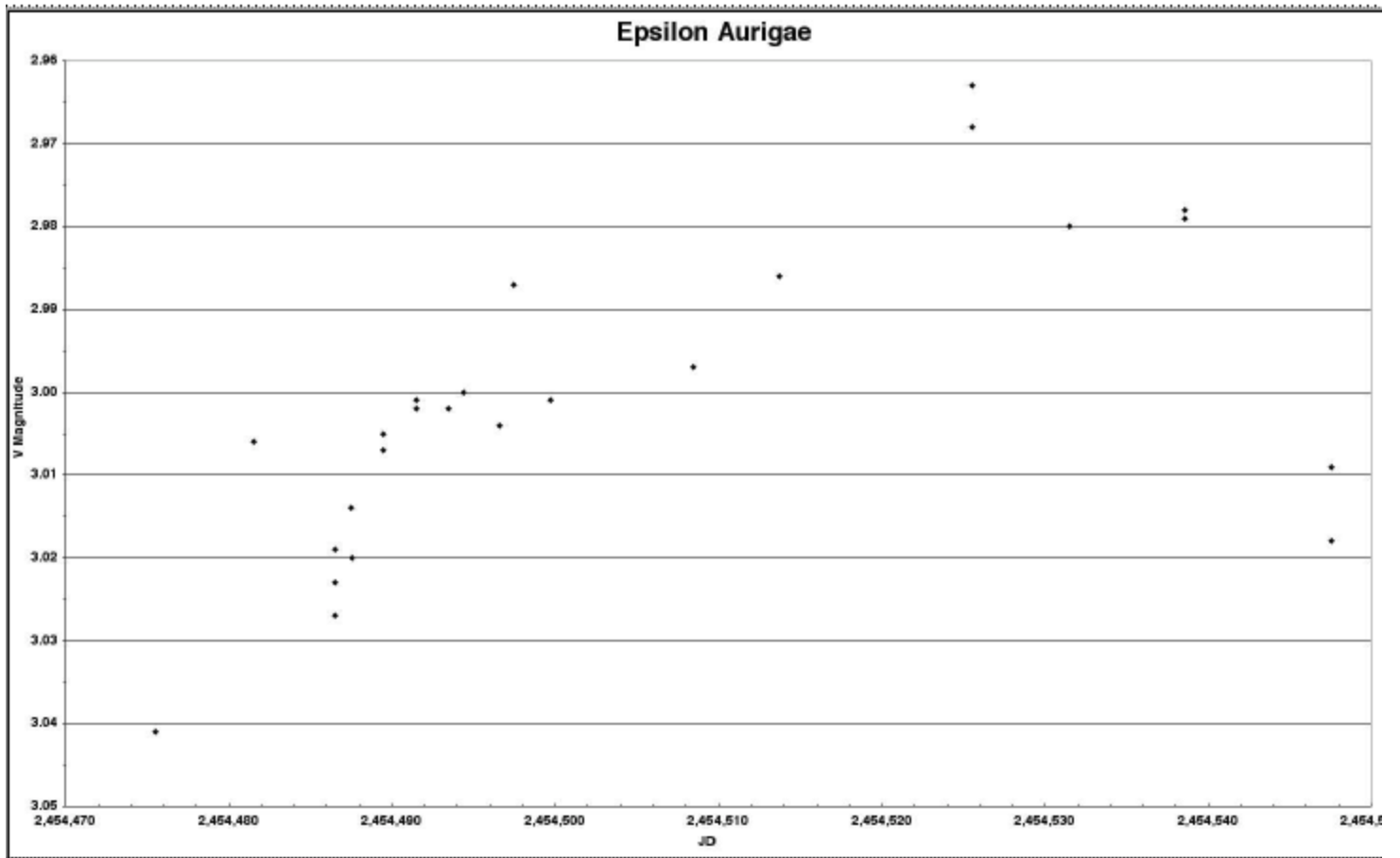
I am nearly ready to order parts to build a polarimeter for the SSP4 to monitor linear polarization. After reading volumes on the subject, I don't see the point in going after the full Stokes parameters at this point and the linear coefficients should provide sufficient information. The unit will have a rotatable IR 1/2 wave plate (the retarder) and fixed IR polarizer, all prior to the SSP4. I have modified my software to include analysis of this data, and I'll take measurements at 3 retarder positions to obtain the polarization angle and degree of polarization (Fessenkov's method). My observing plan will consist of measuring the V and B band magnitudes, then J and H band. Then I'll insert the polarimetry unit, refocus, and measure J and H at position angles of 0, 30 and 60 degrees -

this will be repeated 2-3 times to improve the measurement statistics (we are only looking for a few % in polarization, so the stats are critical). Before I spend the \$\$, I will finish a numerical analysis that will tell me what precision I'll need to confidently attribute changes to polarization.

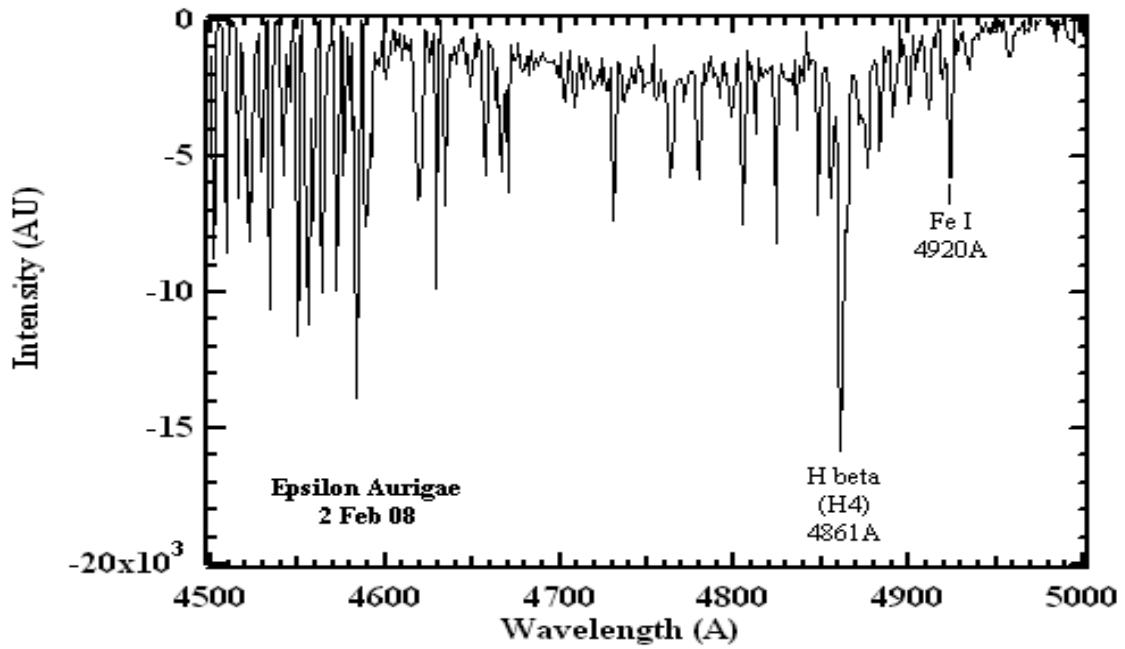
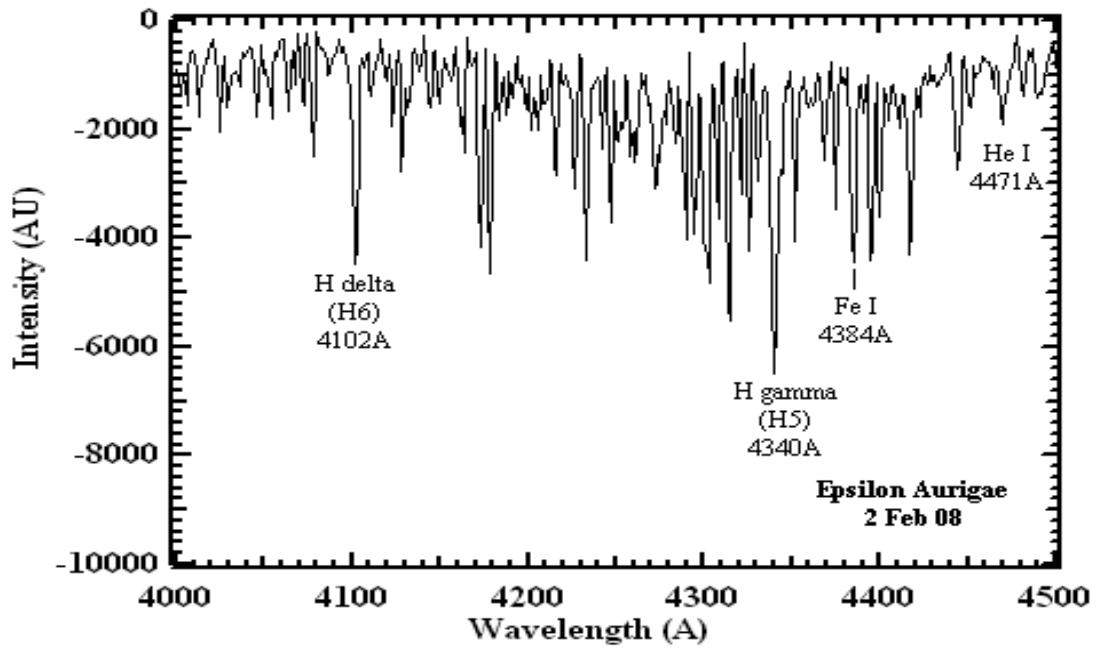
Brian.

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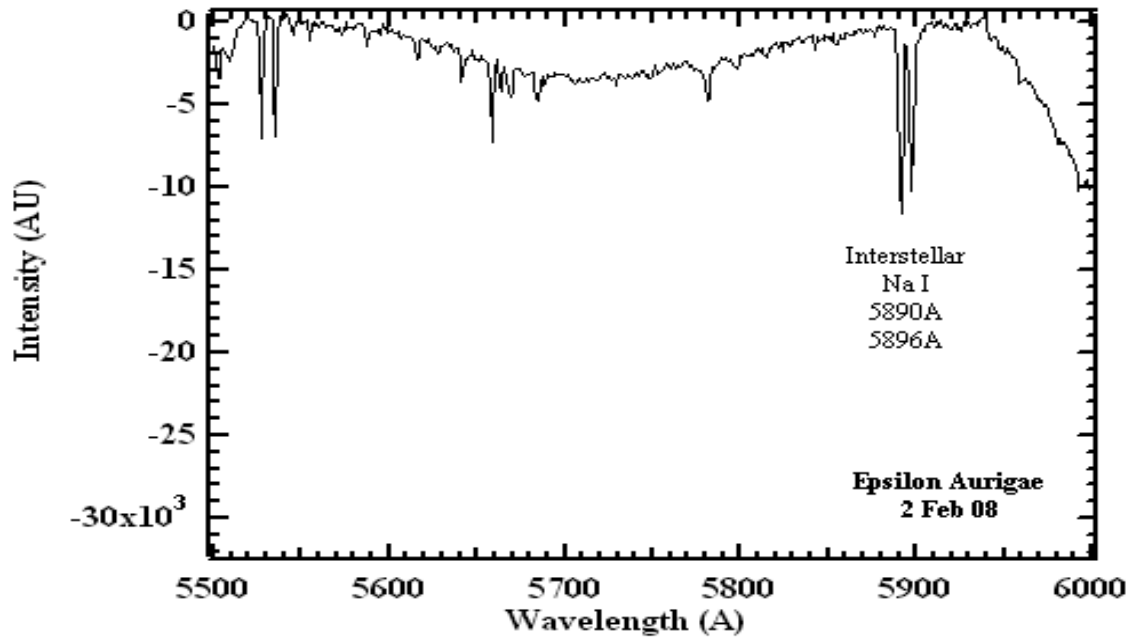
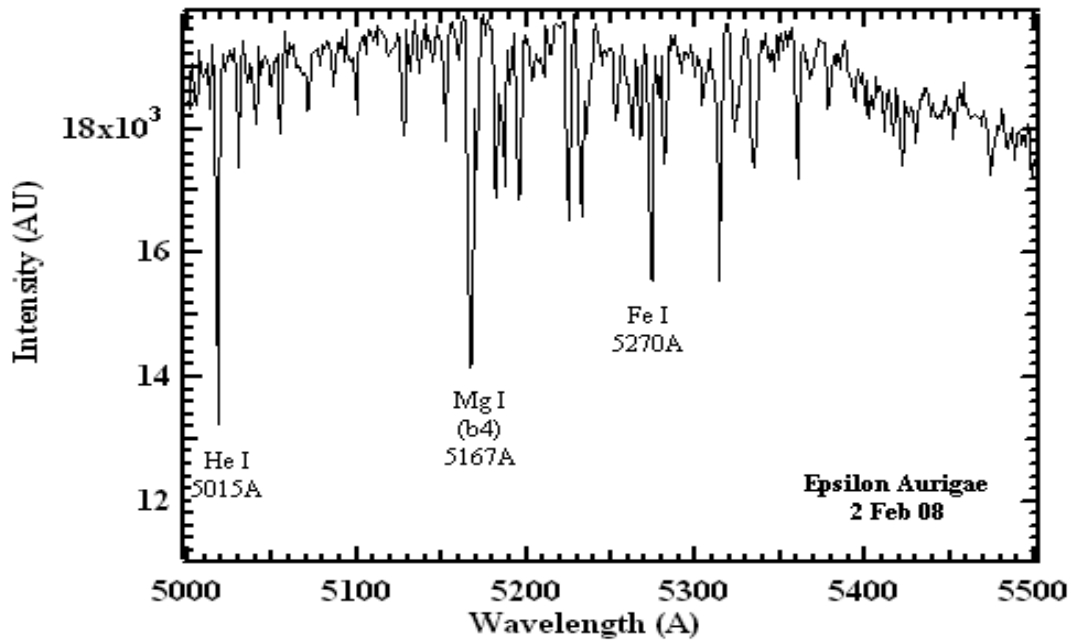
The following are plots of Brian's data :



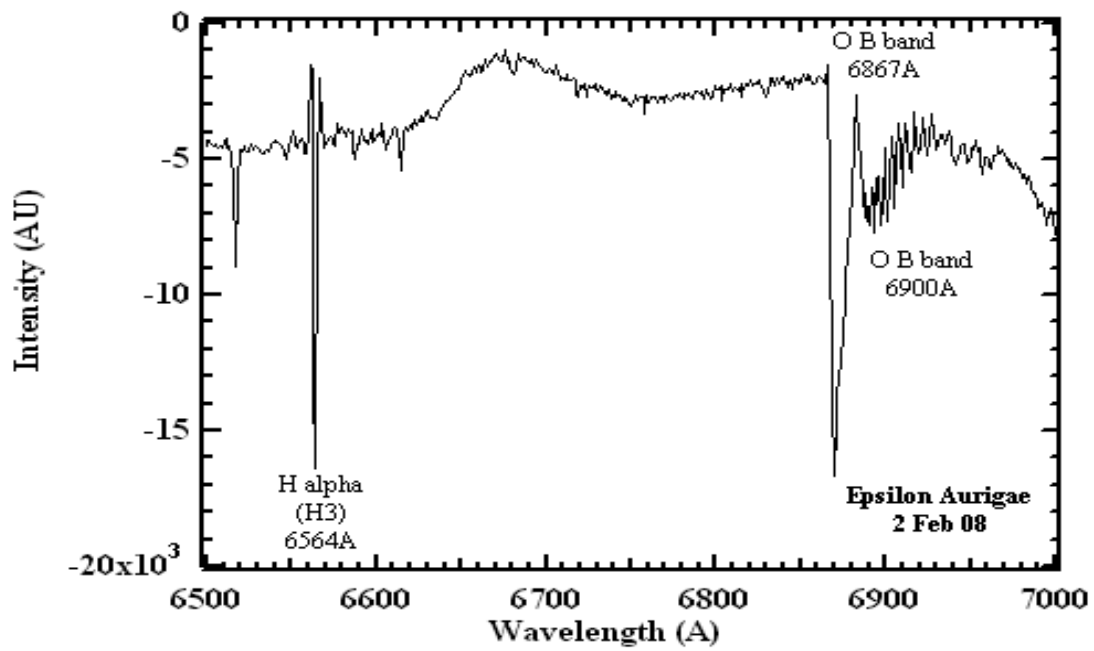
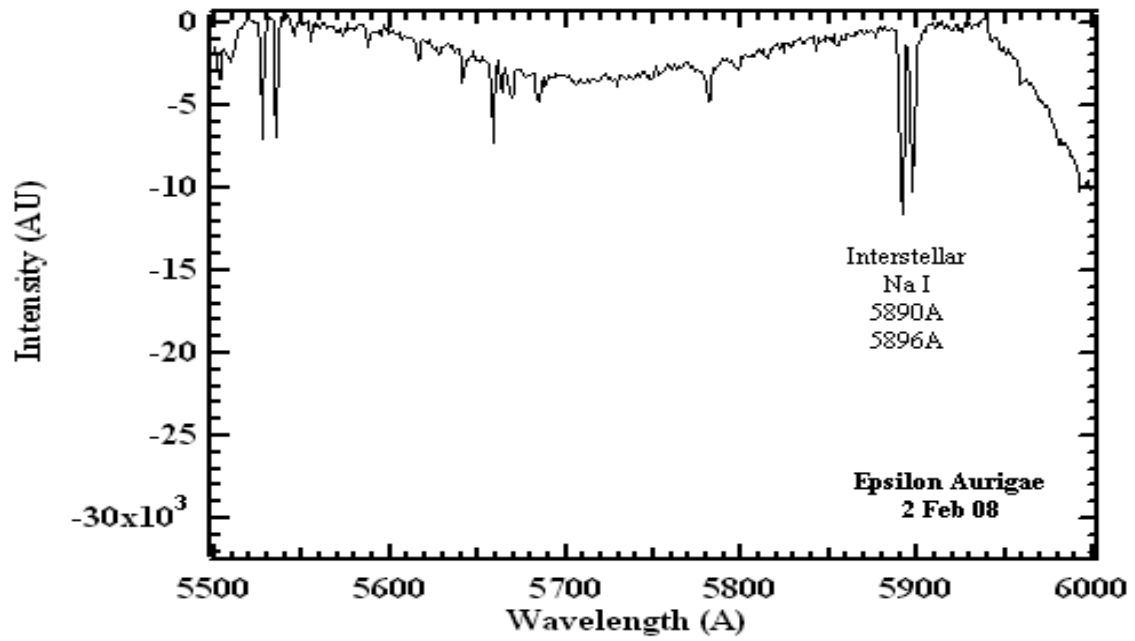
Continuous Spectra



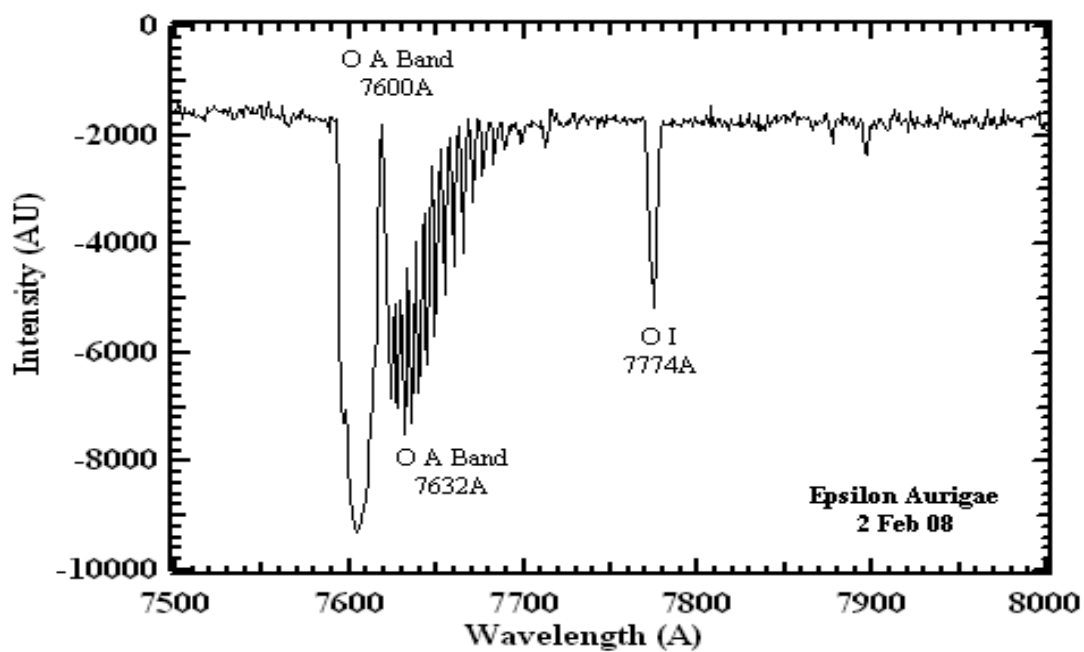
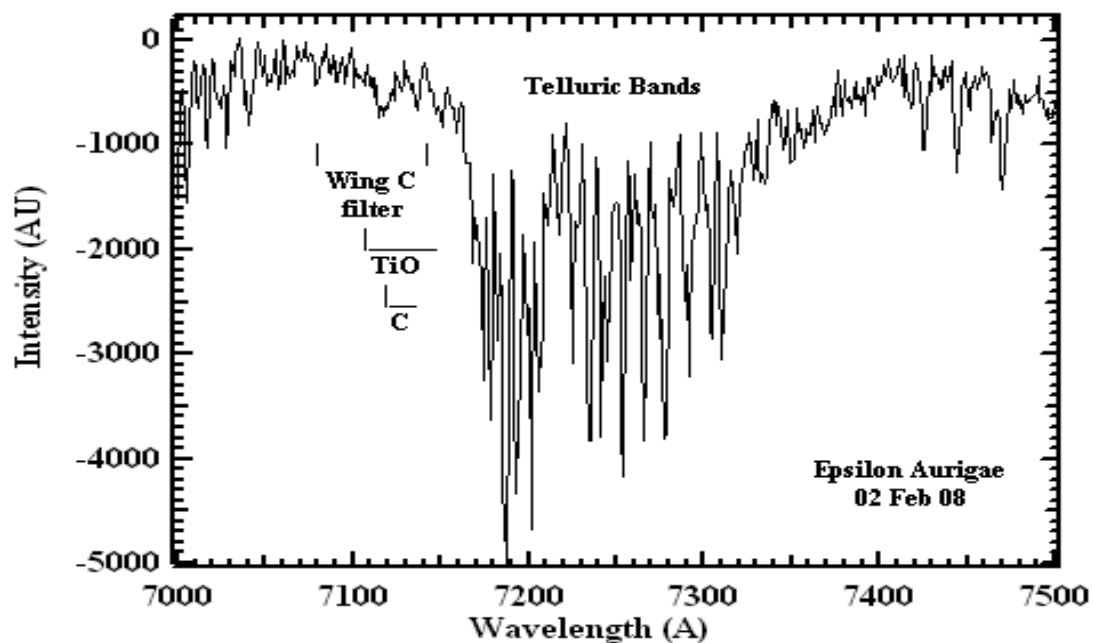
Continuous Spectra (continued)



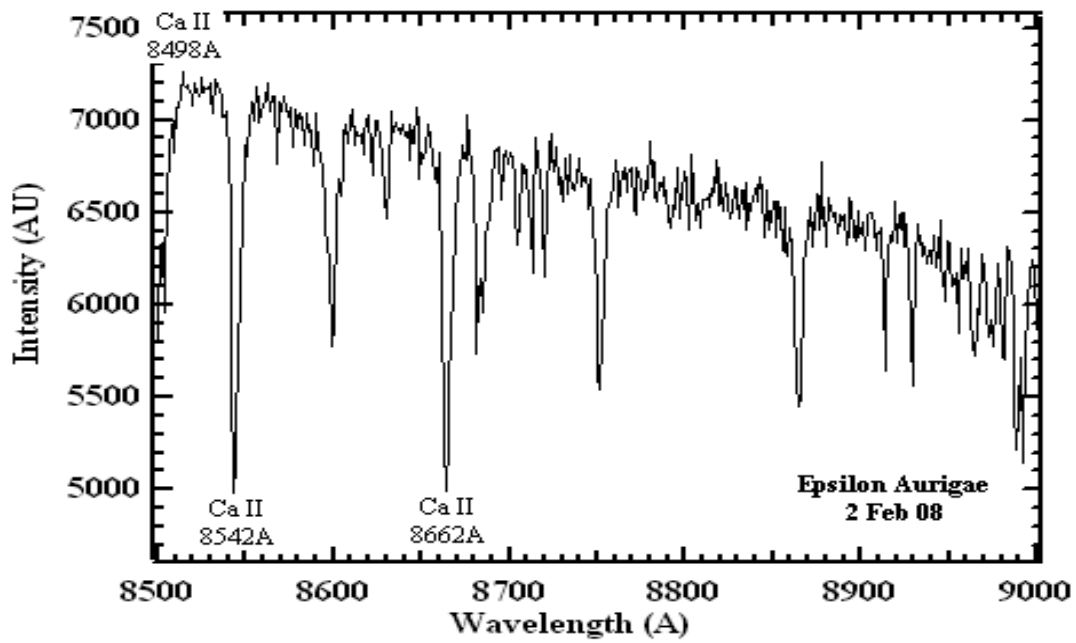
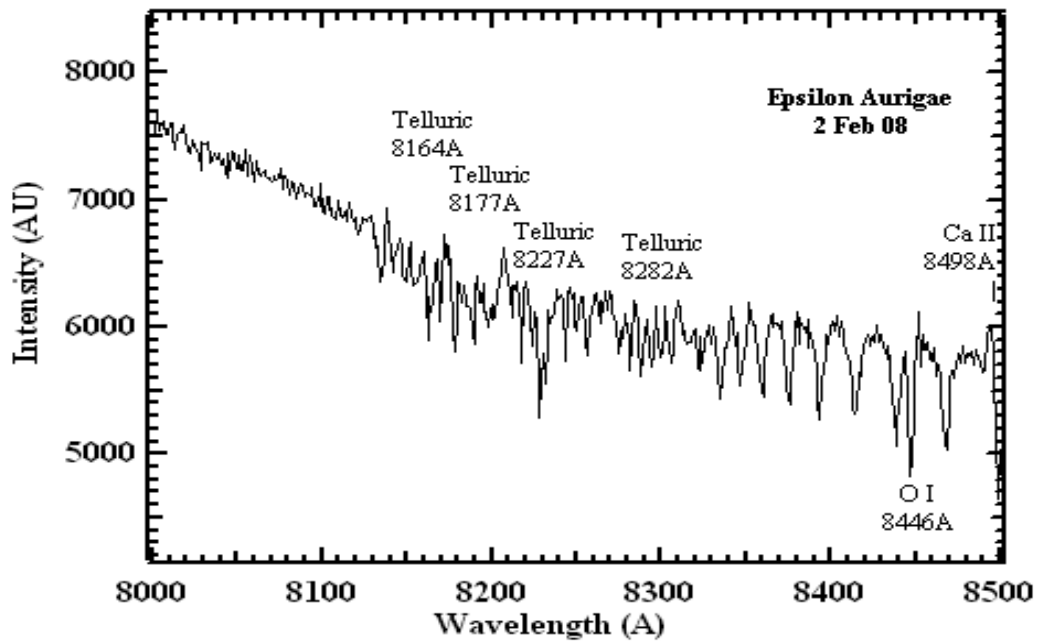
Continuous Spectra (continued)



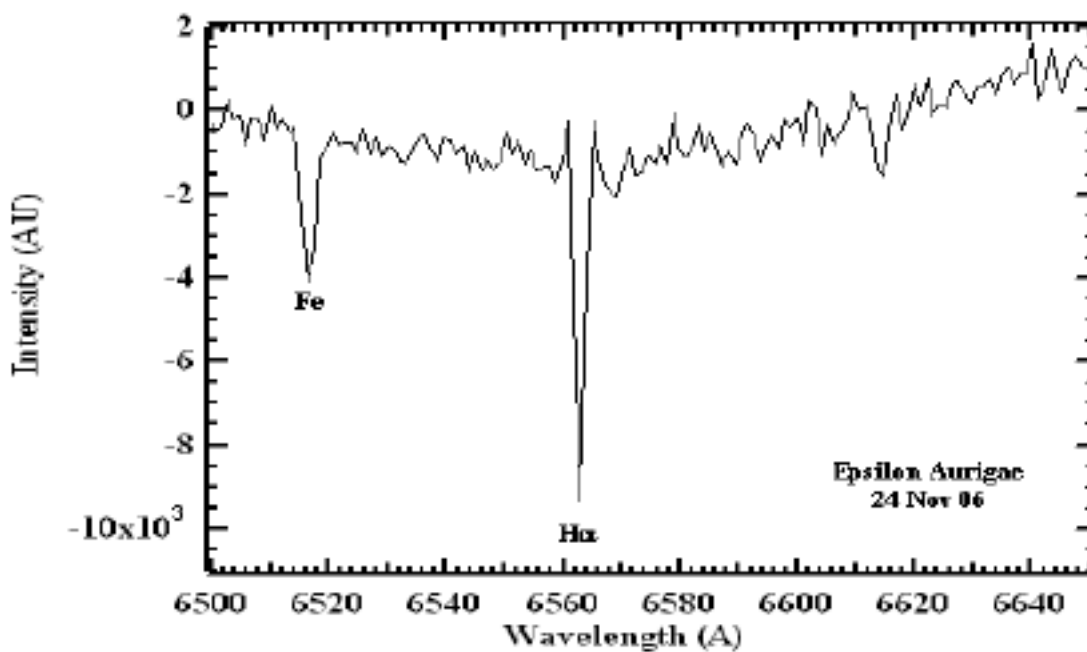
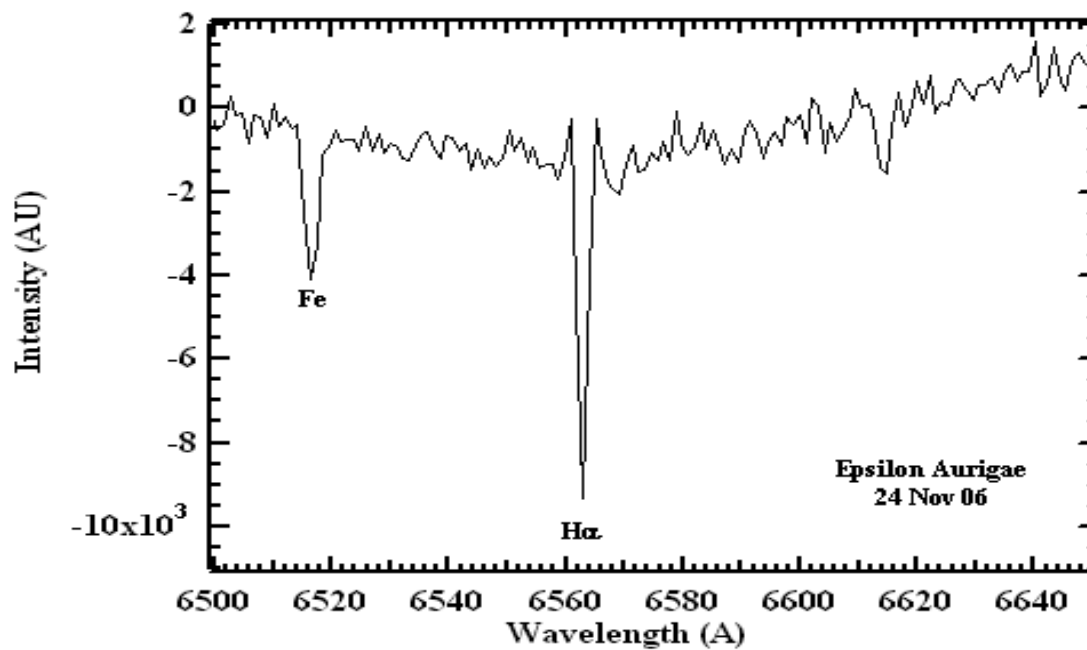
Continuous Spectra (continued)



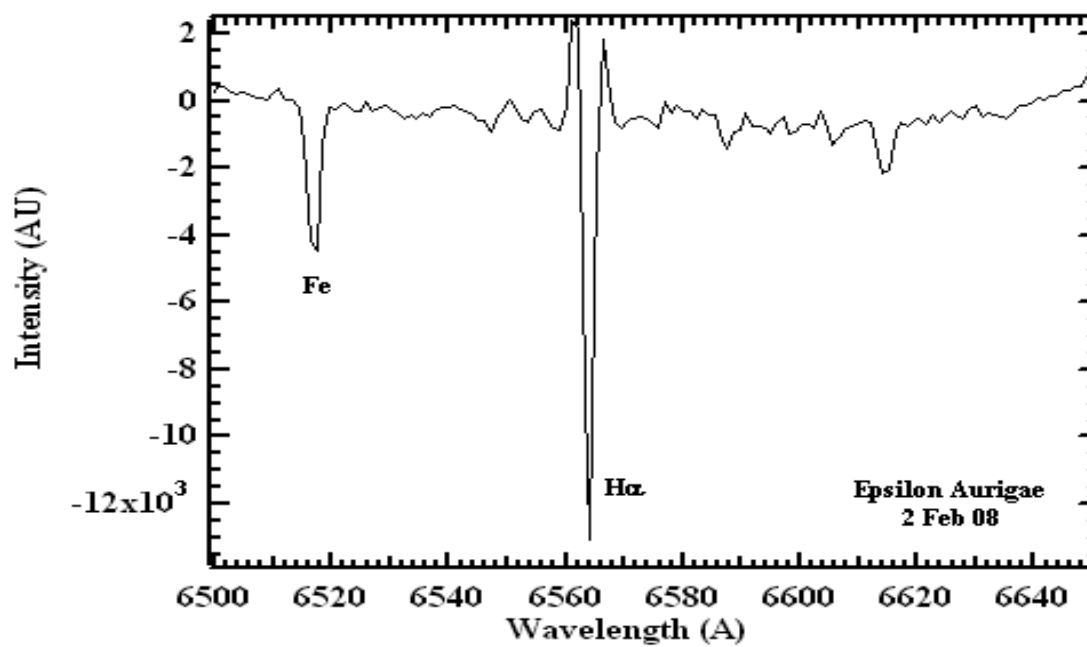
Continuous Spectra (continued)



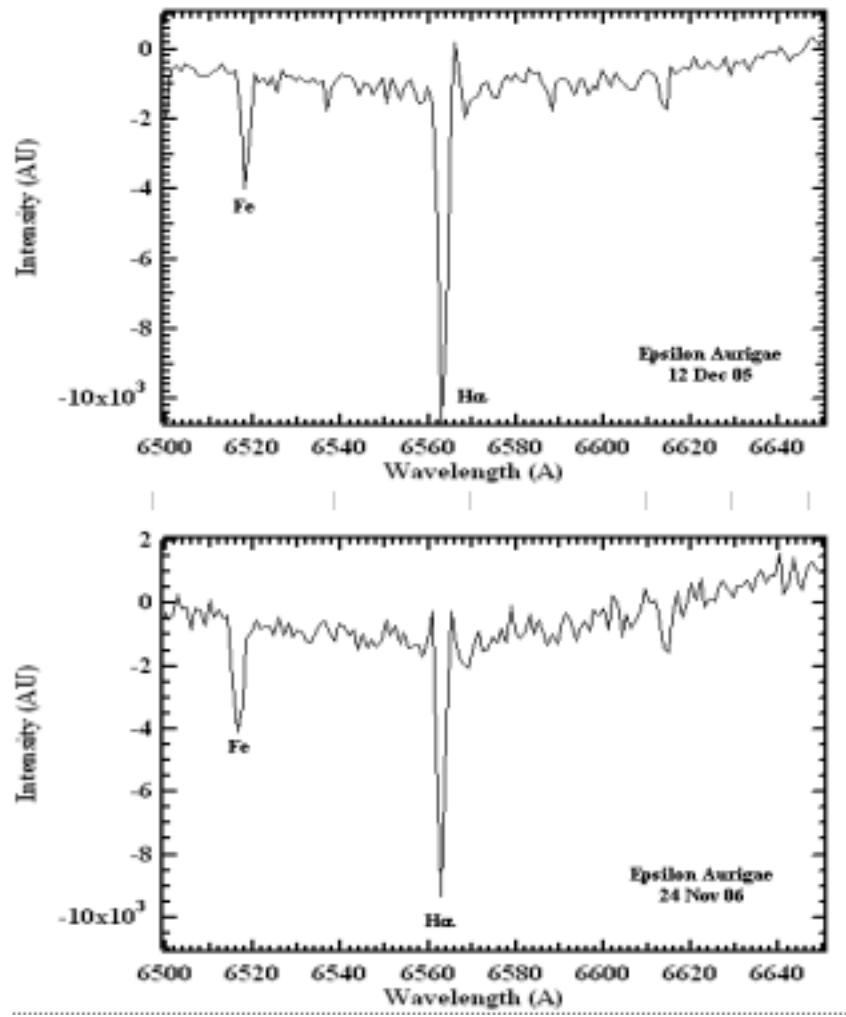
Hydrogen alpha Spectra



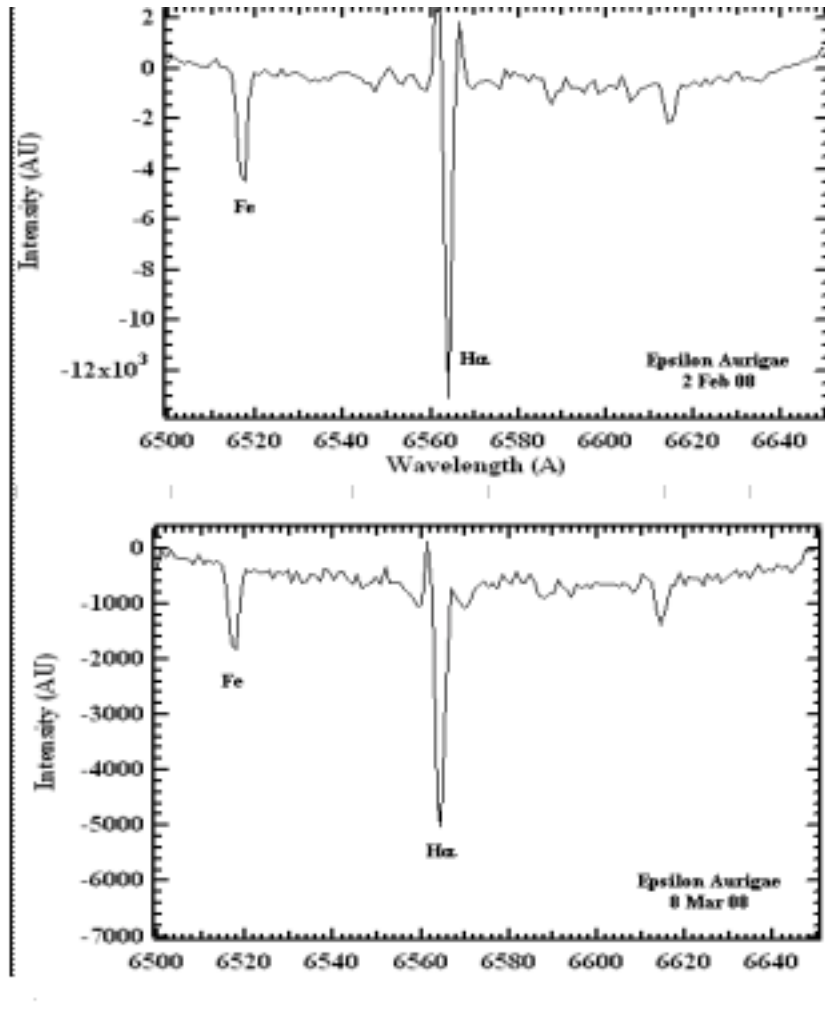
Hydrogen alpha Spectra (continued)



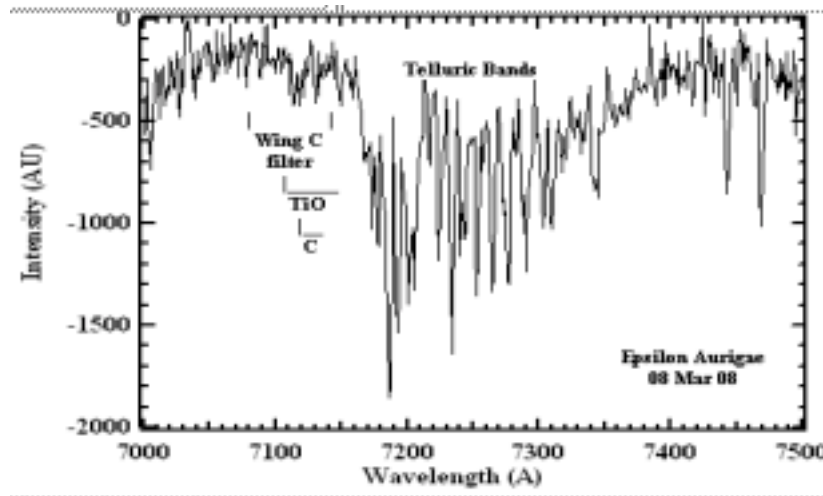
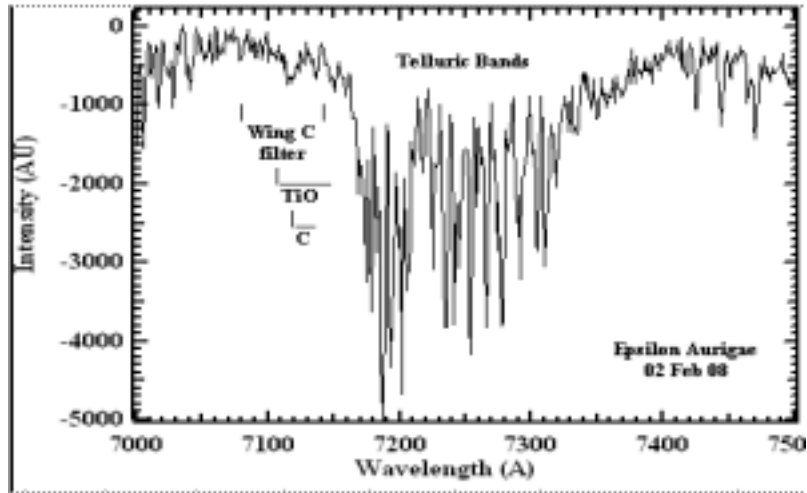
Comparison Spectra



Comparison Spectra (continued)



Comparison Spectra (continued)



From: "RICHARD MILES" <rmiles.btee@btinternet.com>
Subject: Re: [Aavso-photometry] Epsilon Aurigae Notice
Date: Wed, 5 Mar 2008 07:00:43 -0700

I have made a start on V and Ic photometry using my dual photometric telescopes. Last night I obtained the following:

Eps AUR
2008 Mar 4.820 JD 2454530.320

V = 2.944 +/- 0.015
Ic = 2.258 +/- 0.015* (Ic of 4 ref stars yet to be accurately measured)
V-Ic = +0.684 +/- 0.021

It seems that Eps Aur has brightened slightly.

I should point out that these results have been obtained using simultaneous differential CCD photometry of Eps Aur measured relative to four 7th magnitude Hipparcos stars (HIP 23369, 23603, 23778 and 23956). I take 10 sets of images, each image being the average of 20 exposures (0.04 sec in V and 0.13 sec in Ic). The errors quoted are the standard errors of each set of 10 measures. I shalln't submit to the BAA or AAVSO until I have had at least several further observing runs on this variable. I shall also check the magnitudes of my four comparisons using Landolt/Cousins stars first, as well as including a measure of the standard comparison, Lam Aur.

Bright star photometry is difficult using CCD's but at least this technique does mean that accurate data can be obtained in relatively marginal sky conditions compared to when one has to move the scope to measure comparison and check stars separately.

I look forward to contributing to the 2008-2010 Epsilon Aurigae observing campaign.

Cheers,
Richard Miles

Dr. Bob's Report:

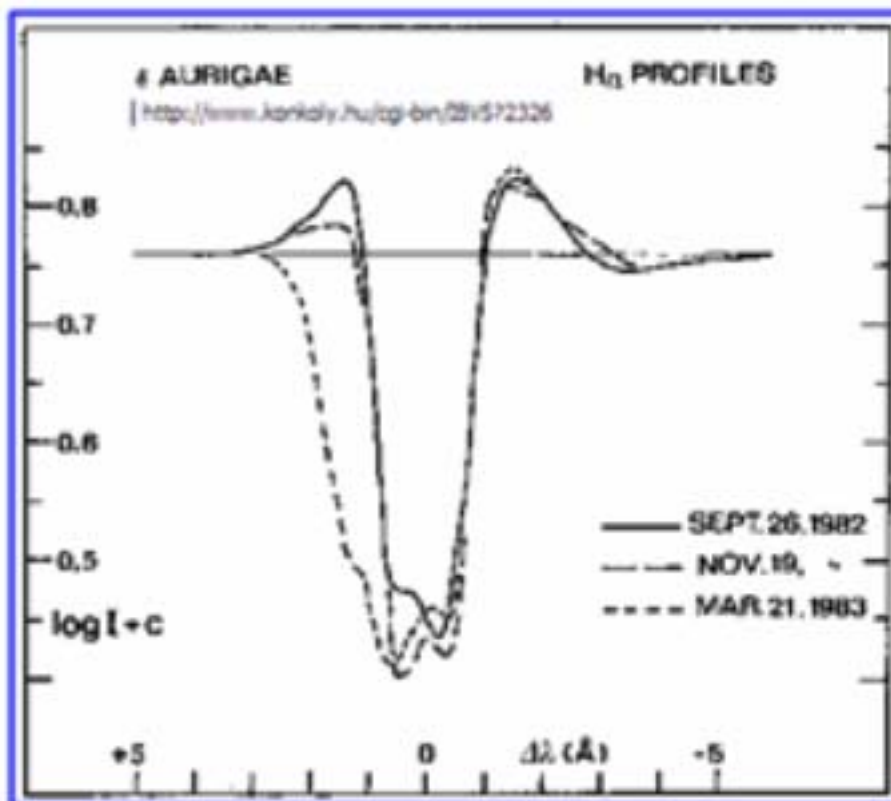
We've completed a series of measurements of epsilon Aurigae with the Palomar Testbed Interferometer and will be reporting results at the May 2008 SAS Science Symposium and eventually in these newsletters.

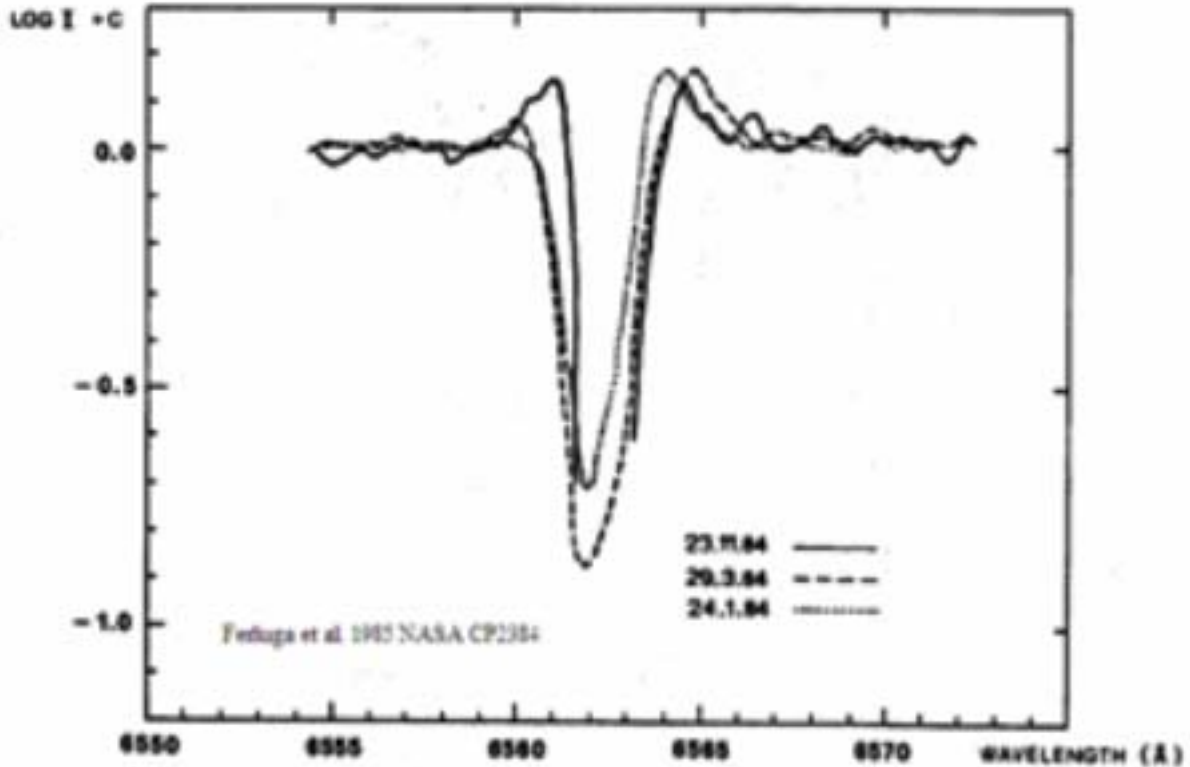
F.Castelli's 1978 fine analysis of epsilon Aur out of eclipse is very interesting for several reasons: he finds sodium abundance based on the strength of the D lines to be 1000 times solar!

http://adsabs.harvard.edu/cgi-bin/nph-bib_query?bibcode=1978A&A....69...23C

Clearly, circumstellar absorption in Na is favored and spectroscopy is needed to monitor this line closely. I thank Lothar Schanne for including a reference to this paper in his IBVS <http://www.konkoly.hu/cgi-bin/IBVS?5747>

Reports on the behavior of H-alpha during eclipse consistently point out the emergence of a redward shifted absorption core during ingress, changing to a blueward shifted absorption core during egress (Ferluga in 1985 NASA CP2384):





Reminder, Original paper copies of the 1985 eps Aur Workshop Proceedings are available on request, free, if interested parties will provide me with a snail mail address. A collector's item! Whiles supplies last.
 -- Robert Stencil <rstencil@du.edu>

Anyone wishing to contribute to the Newsletter, is most welcome. Please send contributions to me at phxjeff@hposoft.com.

Anyone not desiring to receive these Newsletter announcements, please e-mail me and I will remove your name from the list.

Campaign Web Site
<http://www.hposoft.com/Campaign09.html>

Clear Skies!
 Jeff