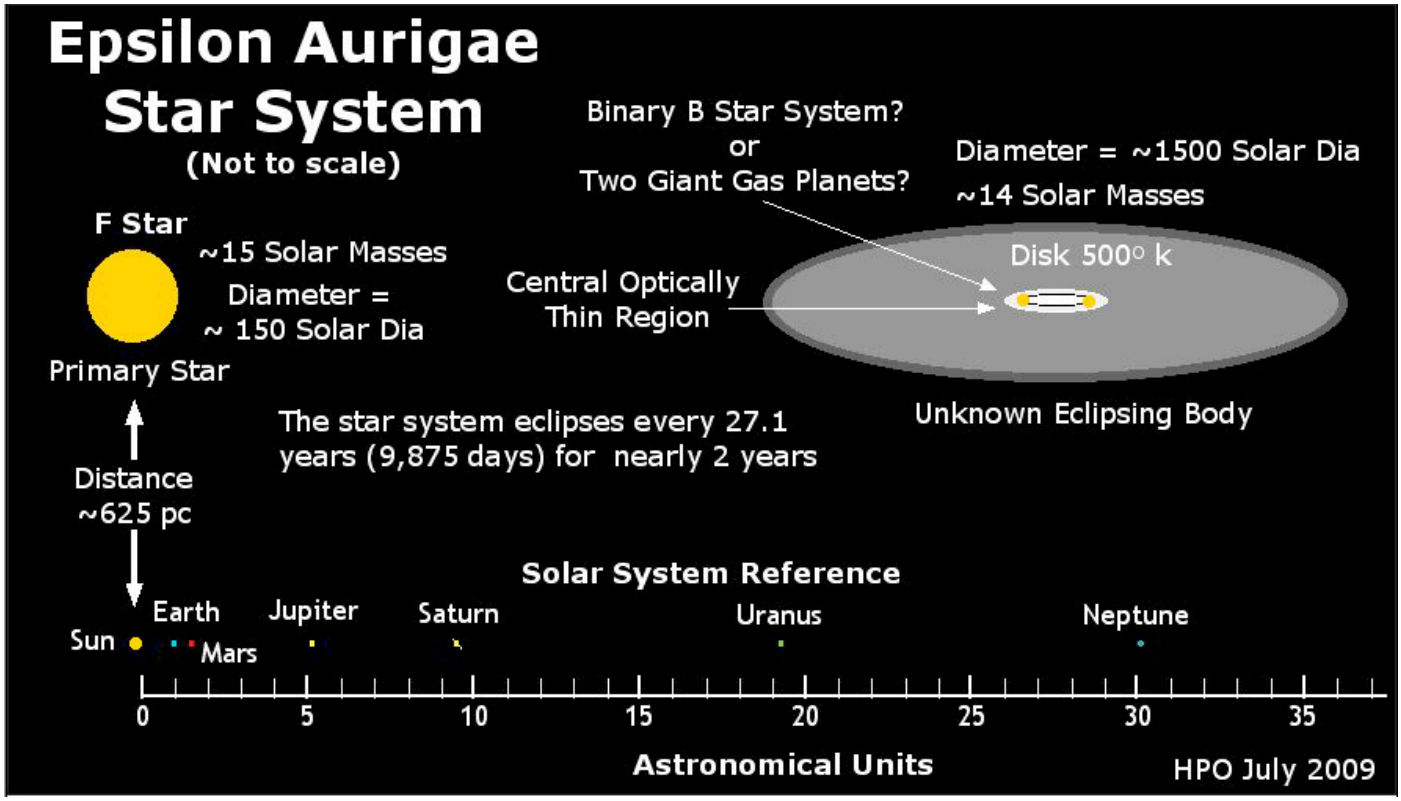
2009 Epsilon Aurigae Eclipse

Campaign Newsletter #15
Fall 2009
Mid-Ingress



Jeff Hopkins, Editor
Hopkins Phoenix Observatory

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

Campaign Web Site

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

see also
https://twitter.com/epsilon_Aurigae

In This Newsletter

Editor's Remarks

Dear Colleagues,

The Campaign now has 48 registered members from around the world.

We are well into the eclipses ingress so I have done some preliminary linear regression calculations to determine approximate first and second contact times. These times assume a linear ingress and are dependent on the average out-of-eclipse and average Totality magnitudes. For the average out-of-eclipse magnitudes data from HPO from December 2003 to April 2009 were used. For the average Totality magnitudes, data from the 1982-1984 eclipse were used. These dates will be refined as we get past second contact point.
Note: Mid-eclipse peak looks like mid-July 2010. A difficult time.

JD Dates are RJD plus 2,400,000

First Contact Estimations as of 17 November 2009
Out-of-Eclipse Averages are assumed to be:
V = 3.0360
B = 3.6050
U = 3.7264
From the Linear Regression Calculation, First Contact:
V Band = 5,5059.266 16 August 2009
B Band = 5,5058.335 15 August 2009
U Band = 5,5061.069 18 August 2009

Second Contact Estimations as of 17 November 2009
Totality Averages are assumed to be:
V = 3.746
B = 4.305
U = 4.516
From the Linear Regression Calculation, Second Contact:
V Band = 5,5204.173 08 January 2010
B Band = 5,5203.269 07 January 2010
U Band = 5,5214.244 18 January 2010

Jeff Hopkins, Editor
Hopkins Phoenix Observatory
phxjeff@hposoft.com

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.

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IAPPP Web Site
(WWW.IAPPP.COM)

Some of you may remember the IAPPP. I have set up a web site for Doug Hall. It is mainly of historical value. Originally the URL was IAPPP.ORG, but my ISP failed to re-register even though I had paid the yearly fee and I lost the domain name. I have a new domain name close, **WWW.IAPPP.COM**.
Note: The **WWW** is required.

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Lambda Aurigae Magnitudes

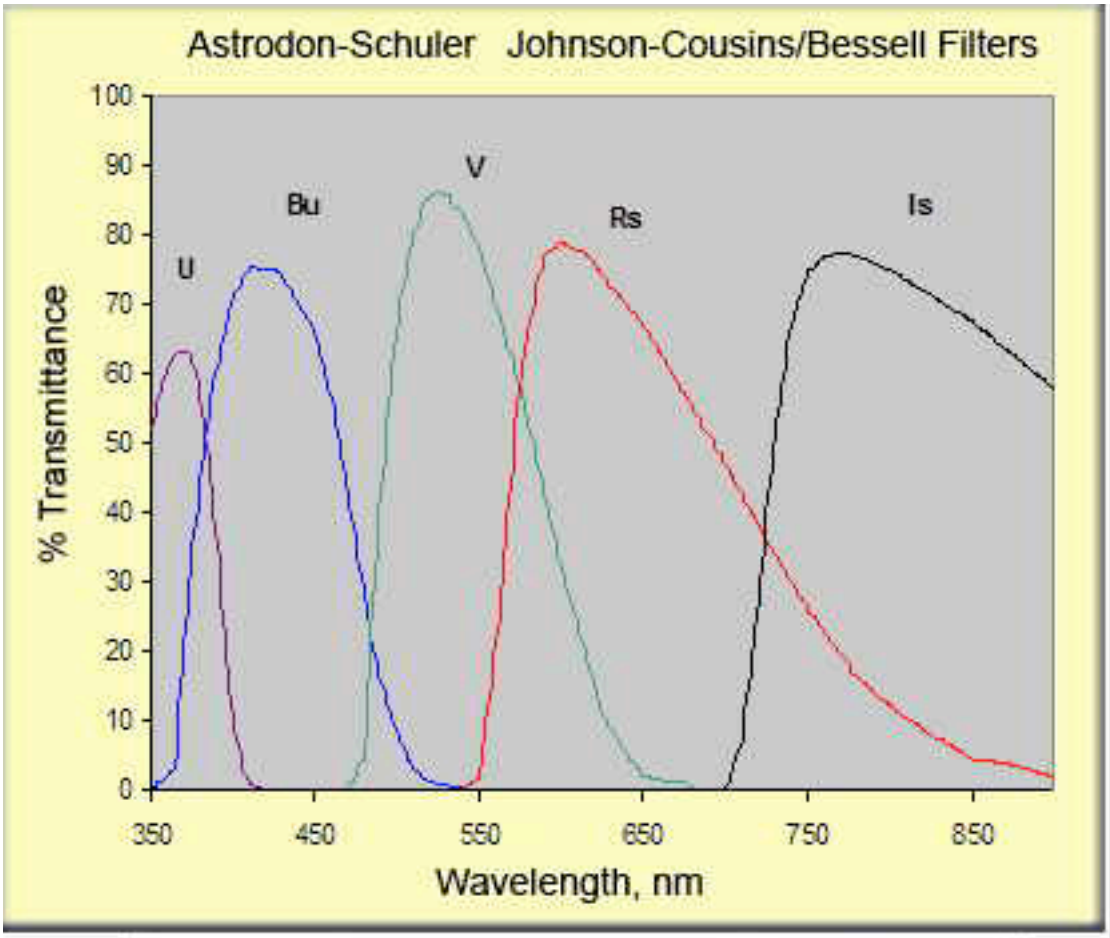
For those using lambda Aurigae for a comparison start please be aware that there are two types of R and I band filters, Johnson and Cousins. Please check which you are using and make sure your system is calibrated properly. Astrodon filters are Cousin filters Rc and Ic where Schuler filters are Johnson, R and I. When submitting data please be sure to indicate which filters you are using. Please use the following magnitudes for lambda Aurigae. Note: This concern is only for the R and I bands.

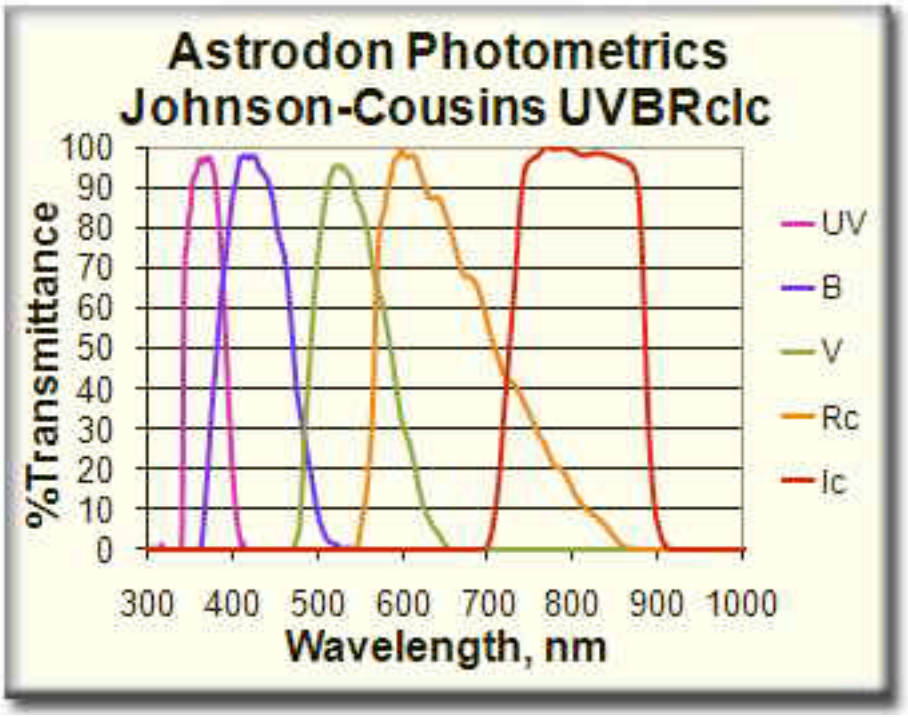
Suggested Lambda Aurigae Magnitudes

U = 5.46
B = 5.34
V = 4.71
Rj = 4.19 (Johnson) Rc =4.340* (Cousins)
Ij = 3.88 (Johnson) Ic =3.998* (Cousins)
J = 3.62
H = 3.33

*** The Rc and Ic magnitudes are from Arne Henden (AAVSO)**
Note: Filtered with Rs and Is are Schuler/Johnson Filters

Johnson and Cousins Filter Responses
Schuler and Astrodon Filers





ZETA AURIGAE

Secondary Eclipse

For those interested in adding some easy and interesting observations to the epsilon Aurigae observations, on around 17 November 2009, JD 2,455,152 the eclipsing binary star system zeta Aurigae is predicted to undergo a secondary eclipse. There is little data on this so observations can be very important. Data in all bands (UBVRIJH) may be useful, but in particular the longer wavelengths may produce the largest magnitude change.

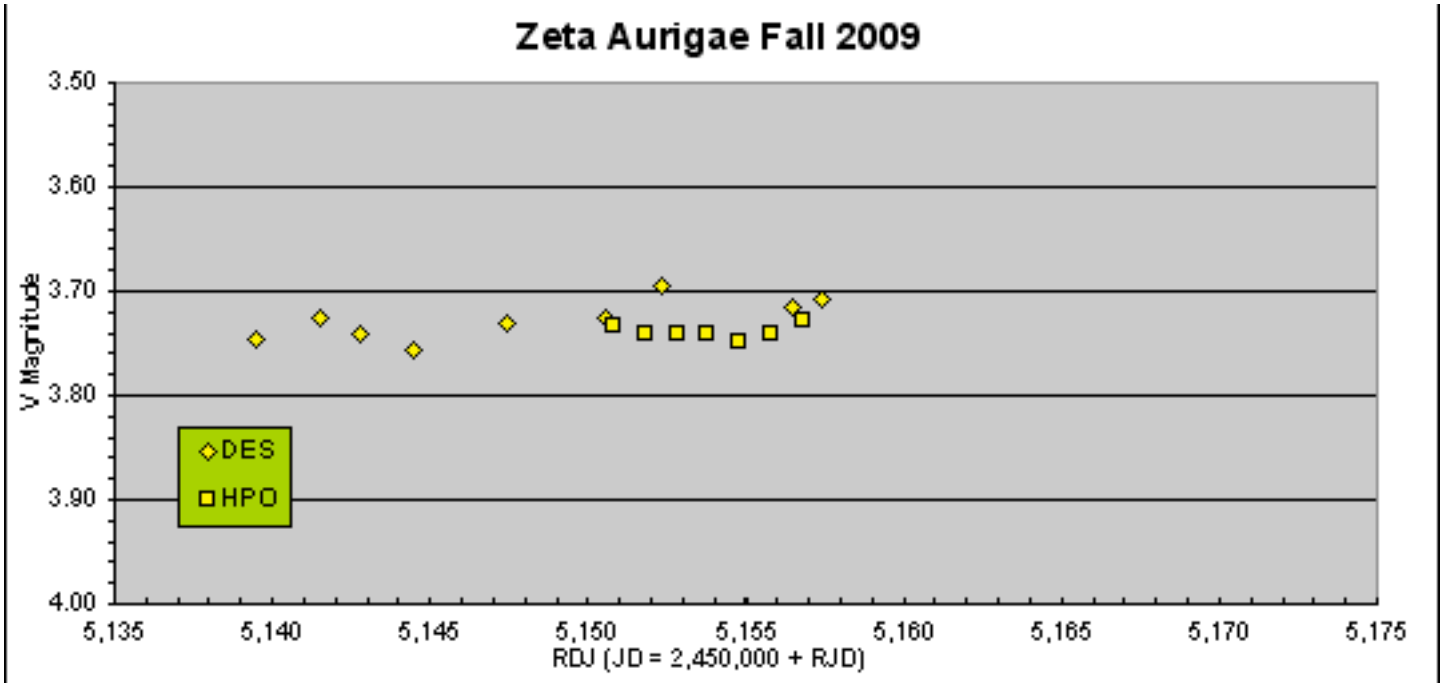
Since the exact date of the secondary is not known it is suggested that observations begin as soon as possible through the end of the year.

Des Loughney (DES), Edinburgh, Scotland, UK

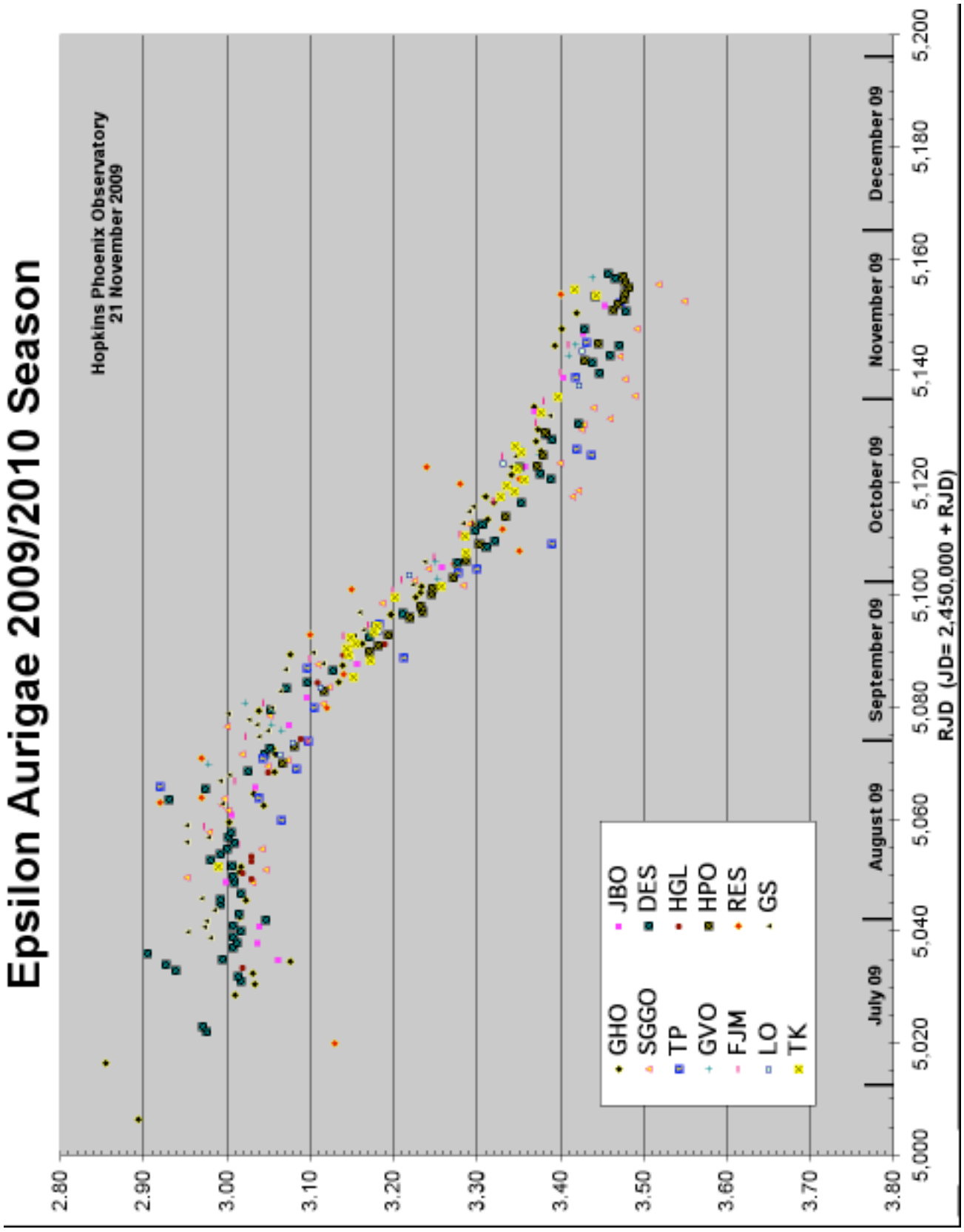
RJD	Date UT	V	SD
5139.517	03/04 November 2009	3.746	0.008
5141.496	05/06 November 2009	3.726	0.008
5142.748	06/07 November 2009	3.740	0.010
5144.494	08/09 November 2009	3.756	0.014
5147.421	11/12 November 2009	3.732	0.010
5150.556	14/15 November 2009	3.726	0.007
5152.346	17/18 November 2009	3.695	0.006
5156.446	20/21 November 2009	3.716	0.003
5157.385	21/22 November 2009	3.708	0.003

Jeff Hopkins, Hopkins Phoenix Observatory (HPO), Phoenix, Arizona USA

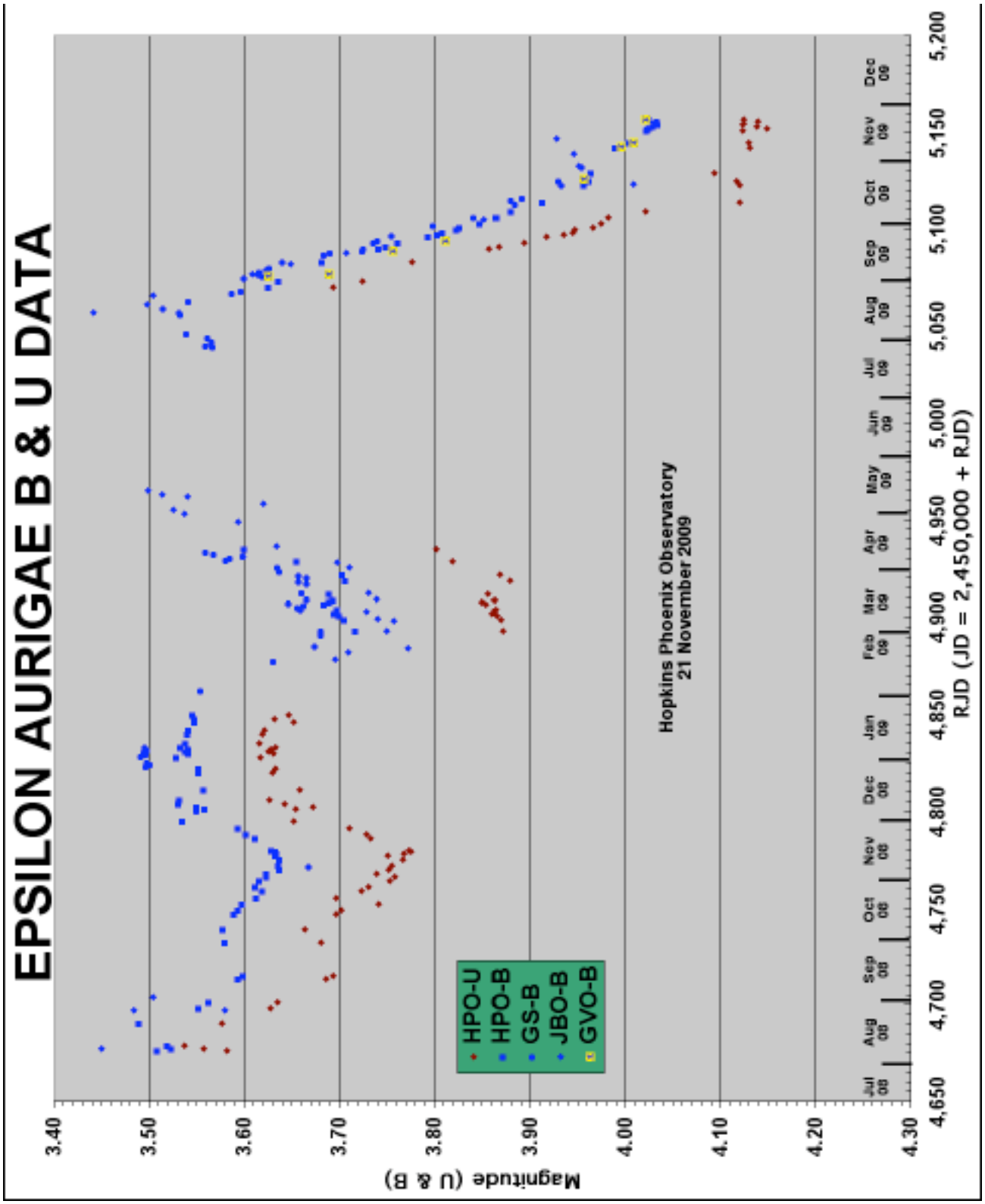
RJD	Date UT	V	SD	B	SD	U	SD
5150.8001	14/15 November 2009	3.7339	0.0039	4.8699	0.0035	5.2008	0.0006
5151.8043	15/16 November 2009	3.7399	0.0034	4.8750	0.0017	5.2056	0.0124
5152.8057	16/17 November 2009	3.7401	0.0021	4.8362	0.0048	5.2152	0.0183
5153.8085	17/18 November 2009	3.7400	0.0003	4.8770	0.0018	5.1935	0.0083
5154.7994	18/19 November 2009	3.7477	0.0145	4.8774	0.0029	5.2151	0.0112
5155.7987	19/20 November 2009	3.7398	0.0046	4.8675	0.0028	5.2028	0.0077
5156.8043	20/21 November 2009	3.7288	0.0088	4.8652	0.0112	5.1921	0.0293



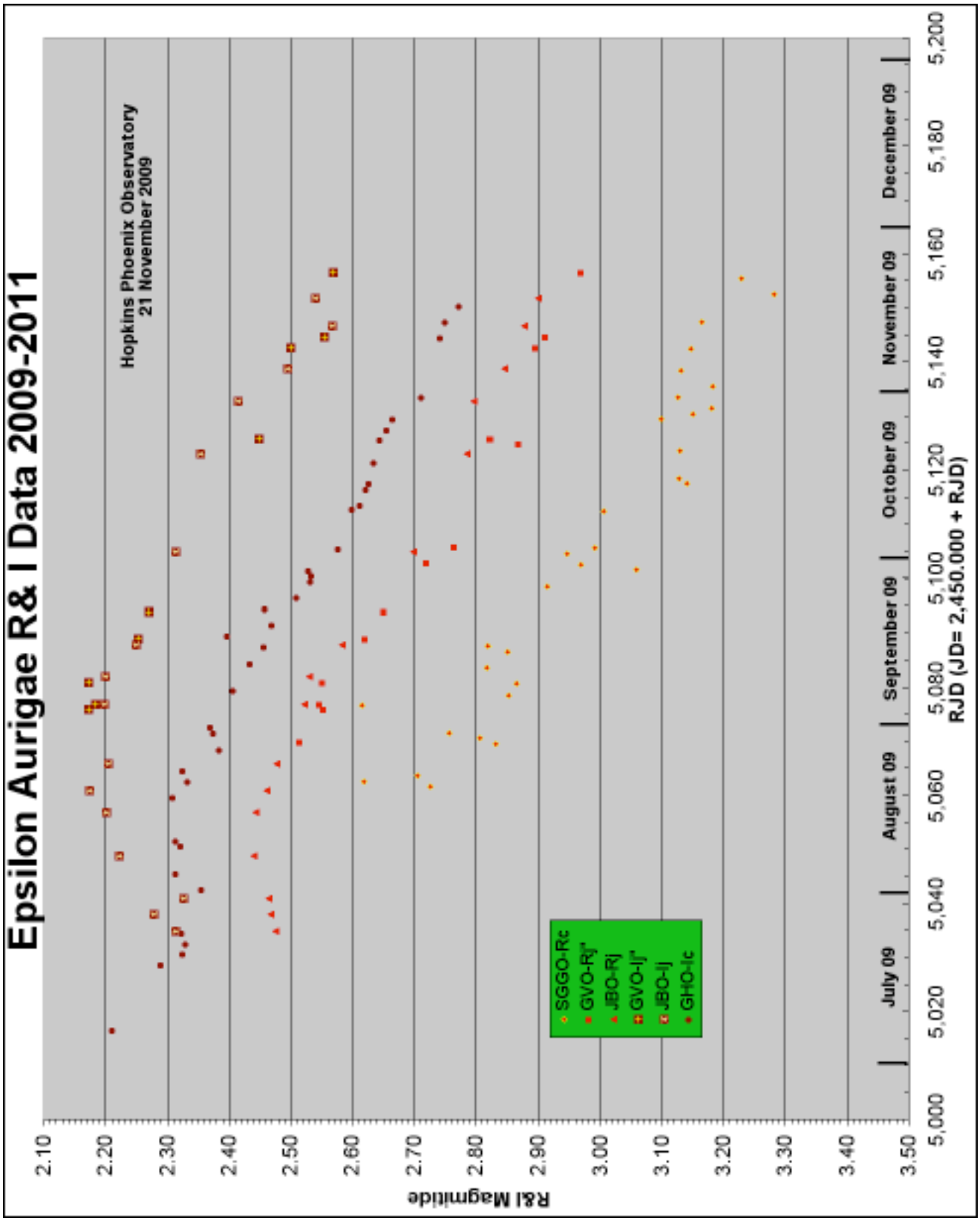
2009-2010 Season Photometry V Data Composite Plot



2009-2010 Season Photometry UB Data Composite Plot



2009-2010 Season Photometry RI Data Composite Plot



Plot Observer Key

GHO - Golden Hill Observatory, Richard Miles, Dorset, England
JBO - Jim Beckmann Observatory, Paul J. Beckmann, Mendota Heights, MN USA
SGGO - S. Giovanni Gatano al Observatory, Tiziano Colombo, Pisa, Italy
DES - Des Loughney, Edinburgh, Scotland, UK
TP - Tom Pearson, Virginia Beach, Virginia USA
HGL - Hans-Goran Lindberg, Skultuna, Sweden
GVO - Grand View Observatory, Brian E. McCandless, Elkton, MD USA
HPO - Hopkins Phoenix Observatory , Jeff Hopkins, Phoenix, Arizona USA
FJM - Frank J. Melillo, Holtsville, NY USA
RES - Stencel/Long, University of Denver, Denver, Colorado USA
LO - Lindarberg Observatory, Snaevarr Gudmundsson, Hafnarfjordur, Iceland
GS - Gerard Samolyk, Greenfield, Wisconsin, USA
TK - Thomas Karisson, Varaberg Observatory, Sweden
Note: RJD is Reduced Julian Date, 2,450,000 has been subtracted from the JD.

Note: Full resolution images of the above plots can be seen at the following links:

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**

2009 Season Photometry Data Summary

Robert E. Stencel, University of Denver, Denver, Colorado USA
Digital camera Bayar Green magnitudes, Comparison Star eta Aurigae assumed to be G = 3.1.

JD	V	SD
2455153.65	3.40	0.17
2455122.71	3.24	0.02
2455120.69	3.35	0.16
2455119.69	3.28	0.04
2455111.70	3.33	0.02
2455107.69	3.35	0.14
2455100.91	3.15	0.04
2455092.89	3.10	0.02
2455085.89	3.14	--
2455079.86	3.12	0.05
2455070.88	2.97	0.02
2455063.88	2.97	0.04
2455062.89	2.92	0.06
2455019.92	3.13	0.15

Snaevarr Gudmundsson (Hafnarfjordur, Iceland)
Lindarberg Observatory
Location (WGS 84) Latitude: +64d 03.740 Longitude: 21d 55.297
Optec SSP-3 on 12" Meade LX 200

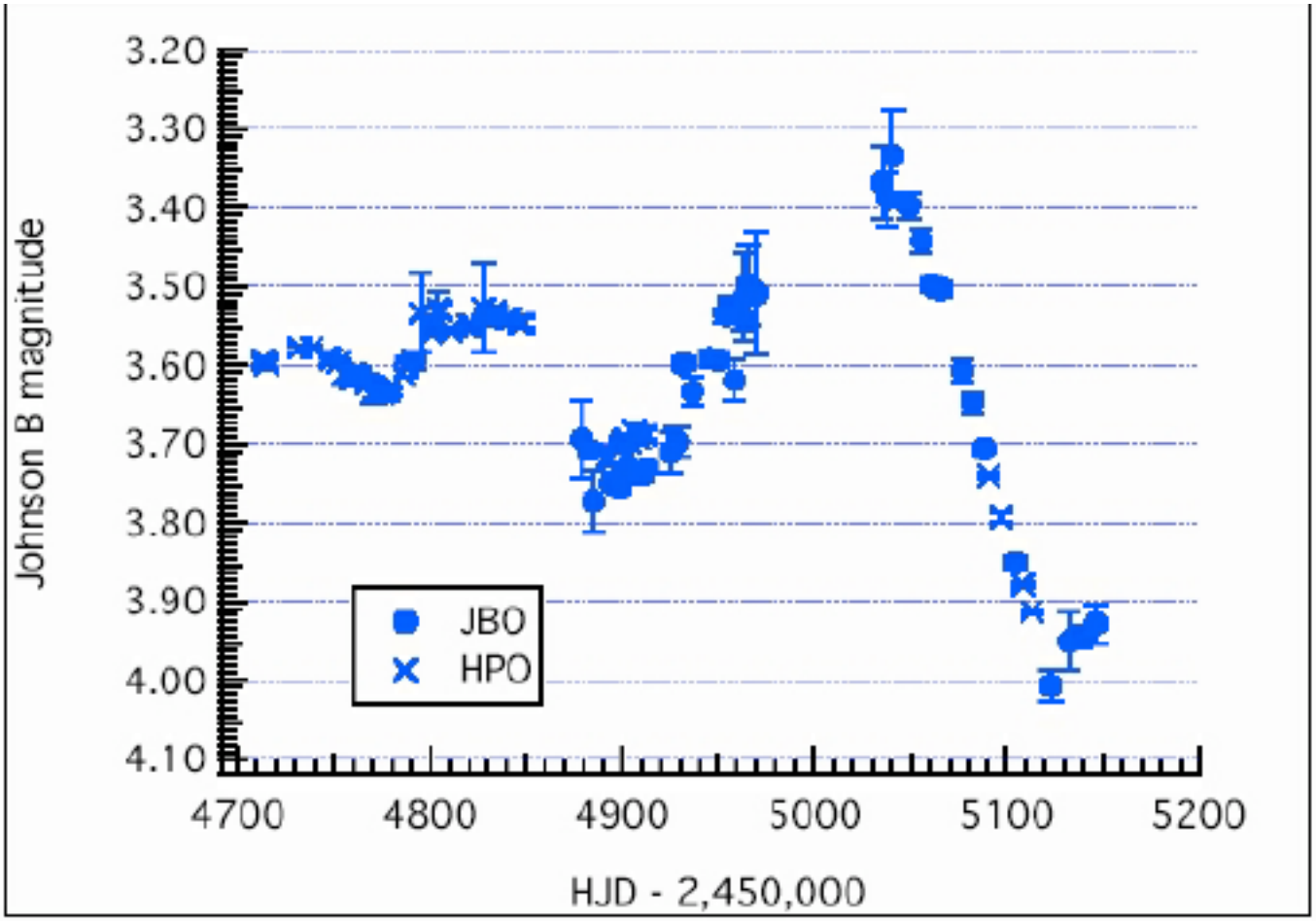
Double Date	RJD	V	#	SD	X
10/11 April 2009	4927.4696	2.965	4	0.049	1.61
15/16 April 2009	4933.5003	2.975	4	0.021	1.87
27/28 August 2009	5071.5463	3.065	4	0.007	1.86
29/30 August 2009	5073.6379	3.080	4	0.014	1.36
08/09 September 2009	5083.6001	3.113	3	0.006	1.40
18/19 September 2009	5093.5748	3.183	3	0.006	1.57
28/29 September 2009	5103.4978	3.220	3	0.005	1.80
18/19 October 2009	5123.5143	3.332	3	0.052	1.32
01/02 November 2009	5137.4657	3.423	3	0.006	1.35
07/08 November 2009	5143.5305	3.426	3	0.006	1.15

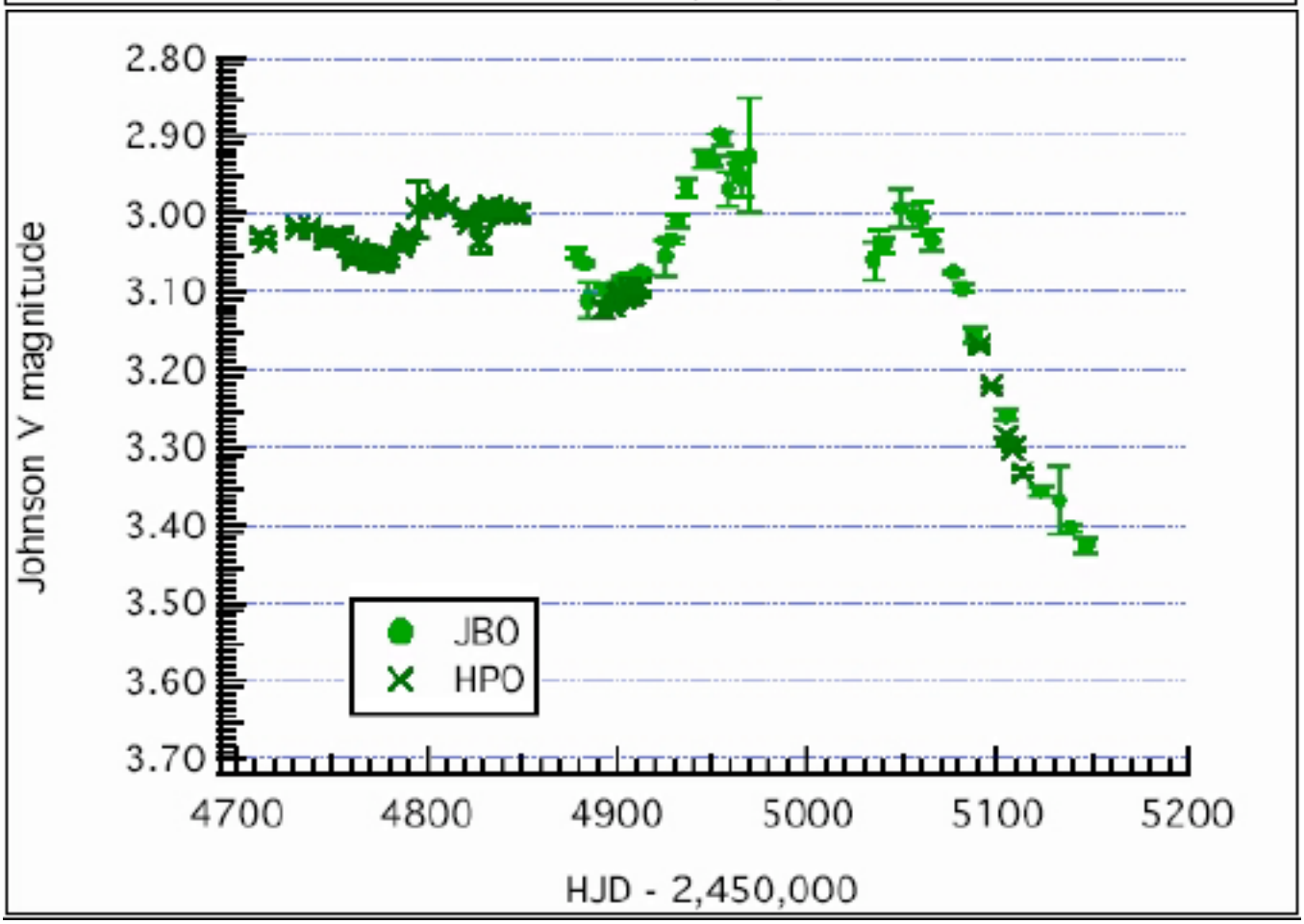
JD = RJD + 2,450,000

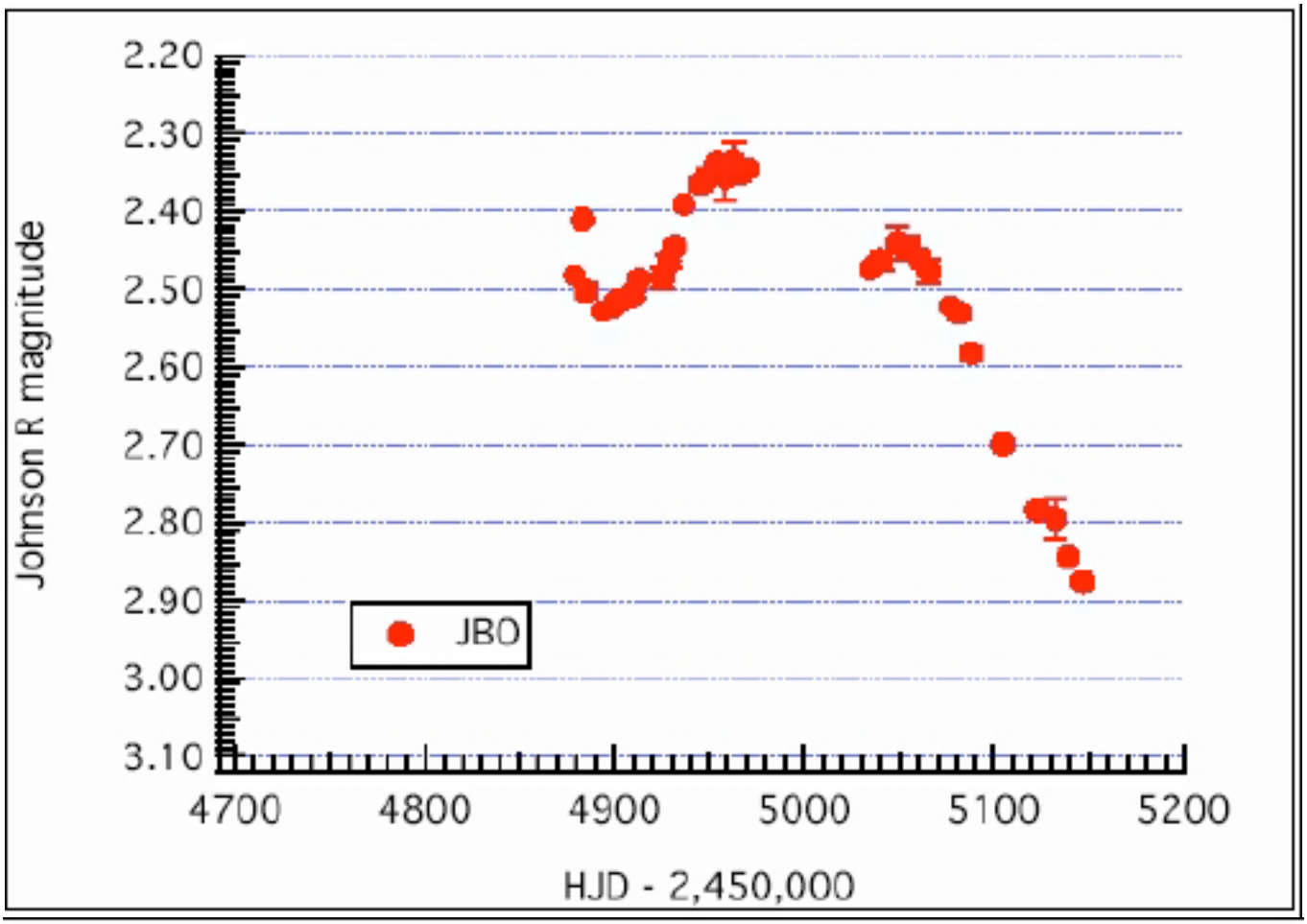
Paul J. Beckmann: Jim Beckmann Observatory (JBO)
Mendota Heights, MN USA
Latitude/Longitude/Altitude (ASL): 44¡53'17.46Ó N 93¡06'53.45Ó W 953 feet ASL
Time Zone: GMT -6 hours Telescope: 8Ó f/10 Meade 2080 optics
Optec SSP-3a Filter Set: Optec Johnson BVRI

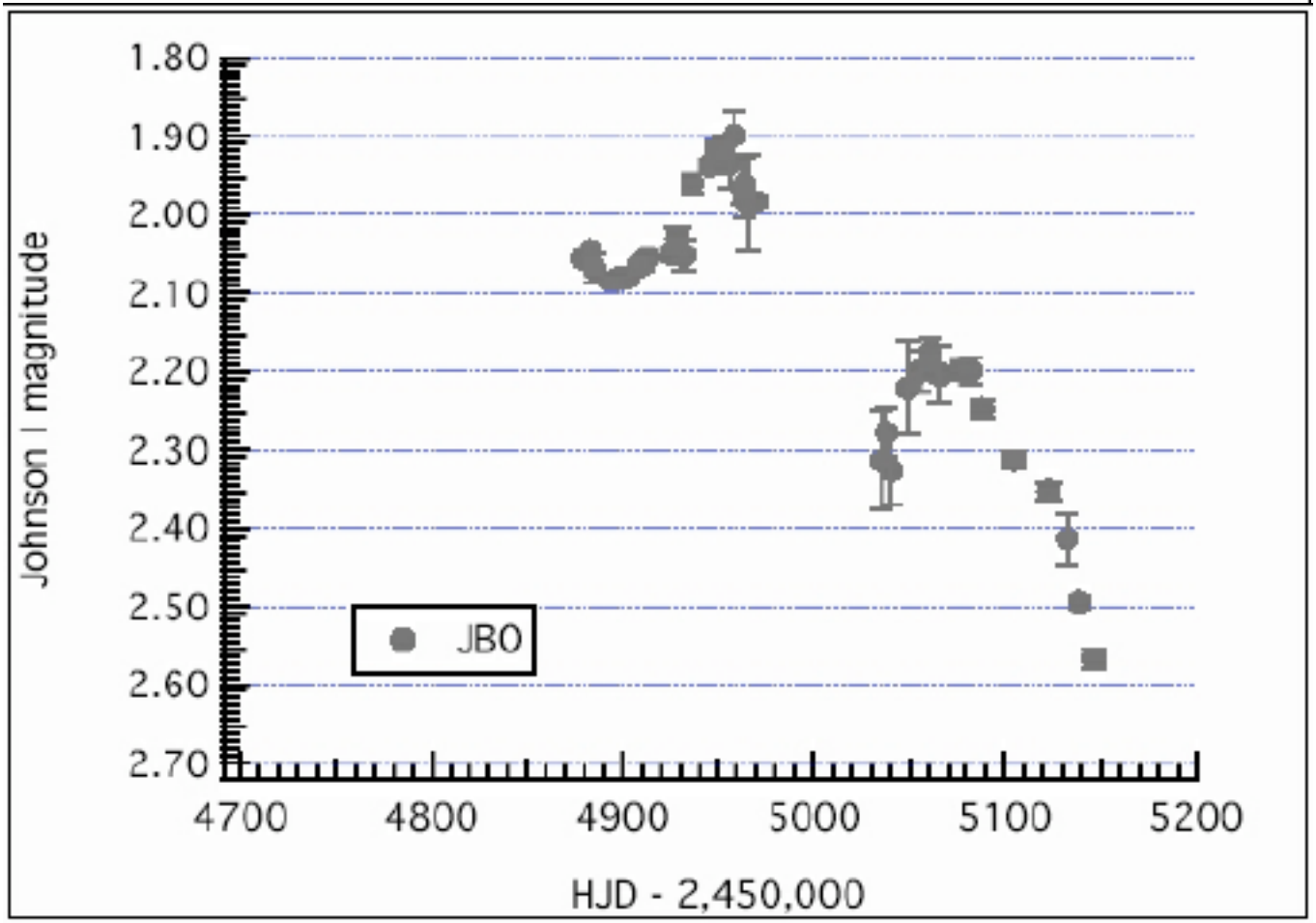
JBO: Jim Beckmann Observatory, Mendota Heights, MN
HP0: Hopkins Phoenix Observatory, Phoenix, AZ
JBO data by Paul J. Beckmann with SSP-3 on Meade 2080 LXD55
Preliminary Data. Do not cite without permission

Jim Beckmann Observatory Plots


Johnson B magnitude
3.20
3.30
3.40
3.50
3.60
3.70
3.80
3.90
4.00
4.10
JBO
HPO
4700
4800
4900
5000
5100
5200
HJD - 2,450,000


Johnson V magnitude
2.80
2.90
3.00
3.10
3.20
3.30
3.40
3.50
3.60
3.70
JBO
HPO
4700
4800
4900
5000
5100
5200
HJD - 2,450,000


2.20
2.30
2.40
2.50
2.60
2.70
2.80
2.90
3.00
3.10
Johnson R magnitude
JBO
4700
4800
4900
5000
5100
5200
HJD - 2,450,000


1.80
1.90
2.00
2.10
2.20
2.30
2.40
2.50
2.60
2.70
Johnson I magnitude
JBO
4700
4800
4900
5000
5100
5200
HJD - 2,450,000

Richard Miles, Golden Hill Observatory
Location: Stourton Caundle, Dorset, England
Latitude/Longitude/Altitude (ASL): West 2.405 deg, North 50.931 deg
Time Zone: GMT = 0 hours
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)

Observation Date	RJD	UT	V mag	SD	Ic	SD
11/12 May 2009	4963.389	21:20	2.927	.025	-	-
30/31 May 2009	4982.390	21:20	2.98	0.01	-	-
01/02 June 2009	4984.410	21:50	3.010	0.015	-	-
07/08 June 2009	4990.420	22:11	2.991	0.006	-	-
23/24 June 2009	5006.430	22:19	2.894	0.016	-	-
03/04 July 2009	5016.476	23:03	2.854	0.036	2.21	0.05
15/16 July 2009	5028.571	02.07	3.010	0.025	2.29	0.015
17/18 July 2009	5030.587	01.54	3.034	0.015	2.324	0.018
19/20 July 2009	5032.535	01.03	3.031	0.008	2.330	0.015
21/22 July 2009	5034.526	00.52	3.076	0.031	2.323	0.025
29/30 July 2009	5042.518	01:00	3.016	0.012	2.355	0.011
01/02 August 2009	5045.532	00:34	3.023	0.012	2.314	0.018
06/07 August 2009	5050.605	02:31	3.016	0.008	2.321	0.008
07/08 August 2009	5051.586	02:31	3.017	0.008	2.313	0.010
15/16 August 2009	5059.494	23:48	3.003	0.010	2.308	0.010
18/19 August 2009*	5062.445	22:40	3.044	0.006	2.333	0.007
20/21 August 2009*	5064.483	23:24	3.032	0.006	2.325	0.006
24/25 August 2009*	5068.435	22:51	3.058	0.008	2.384	0.005
27/28 August 2009*	5071.539	-	3.059	0.006	2.375	0.006
28/29 August 2009*	5072.648	-	3.055	0.010	2.370	0.004
04/05 September 2009	5079.438	-	3.038	0.010	2.407	0.011
09/10 September 2009	5084.400	-	3.134	0.007	2.434	0.013
12/13 September 2009	5087.426	-	3.139	0.006	2.456	0.010
14/15 September 2009	5089.397	-	3.076	0.006	2.397	0.012
16/17 September 2009	5091.418	-	3.163	0.005	2.469	0.012
19/20 September 2009	5094.456	-	3.184	0.018	2.458	0.015
21/22 September 2009	5096.418	-	3.197	0.005	2.510	0.008
24/25 September 2009	5099.424	-	3.227	0.005	2.532	0.005
25/26 September 2009	5100.427	-	3.233	0.004	2.534	0.004
26/27 September 2009	5101.432	-	3.234	0.004	2.529	0.003
31/01 Sept/Oct 2009	5105.336	-	3.275	0.010	2.577	0.011
07/08 October 2009	5112.702	-	3.295	0.004	2.600	0.003
08/09 October 2009	5113.401	-	3.312	0.006	2.612	0.008
11/12 October 2009	5116.434	-	3.320	0.003	2.621	0.003
12/13 October 2009	5117.442	-	3.310	0.006	2.627	0.004
16/17 October 2009	5121.402	-	3.341	0.005	2.635	0.002
20/21 October 2009	2125.586	-	3.376	0.008	2.645	0.007
22/23 October 2009	5127.412	-	3.371	0.005	2.656	0.004
24/25 October 2009	5129.450	-	3.373	0.004	2.665	0.003
01/02 November 2009	5133.522	-	3.368	0.005	2.711	0.003
08/09 November 2009	5144.407	-	3.393	0.007	2.742	0.006
11/12 November 2009	5147.467	-	3.402	0.008	2.750	0.003
14/15 November 2009	5150.312	-	3.419	0.004	2.773	0.004

JD = RJD + 2,450,000, RJDs and UTs are average for V and Ic observations.

Dr. Tiziano Colombo, S. Giovanni Gatano al Observatory
Pisa, Italy
CCD Camera: Mead DSI Pro, 2 sec exposures, 20 images stacked, F 2.8

RJD	V Mag	SD	Rc	Mag SD
5048.6292	3.031	0.213	-	-
5049.6139	2.952	0.164	-	-
5050.9181	3.047	0.097	-	-
5054.6160	3.042	0.148	-	-
5055.6243	3.011	0.197	-	-
5056.6111	2.613	0.165	-	-
5057.6208	2.979	0.109	-	-

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Note: The following data are corrected as of 20 November 2009

5061.5736	3.002	-	2.726	-
5062.5681	2.993	-	2.619	-
5063.5979	2.997	-	2.706	-
5069.5625	3.049	-	2.831	-
5070.5625	3.073	-	2.807	-
5071.5590	3.018	0.014	2.756	0.066
5076.5472	3.000	0.013	2.615	0.090
5078.5208	3.052	0.196	2.852	0.103
5080.6042	3.115	0.011	2.865	0.001
5083.6146	3.123	0.006	2.818	0.053
5086.6111	3.126	0.029	2.849	0.032
5087.5833	3.110	0.005	2.820	0.063
5098.5000	3.187	0.045	2.914	0.056
5101.5556	3.284	0.022	3.058	0.021
5102.5521	3.226	0.036	2.968	0.036
5104.5000	3.243	0.011	2.946	0.014
5105.5076	3.272	0.018	2.991	0.048
5112.4479	3.291	0.026	3.006	0.033
5117.5000	3.414	0.021	3.141	0.048
5118.5000	3.421	0.017	3.128	0.089
5123.5000	3.399	0.010	3.129	0.054
5129.4375	3.425	0.010	3.099	0.053
5130.4063	3.427	0.011	3.150	0.014
5131.4479	3.459	0.013	3.180	0.109
5133.3958	3.439	0.049	3.126	0.092
5135.4444	3.489	0.024	3.182	0.091
5138.4382	3.477	0.100	3.130	0.100
5142.4583	3.471	0.018	3.146	0.021
5147.3750	3.492	0.010	3.164	0.014
5152.4583	3.549	0.039	3.282	0.081
5155.3750	3.518	0.040	3.229	0.114

JD = RJD + 2,450,000

Des Loughney
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 them with AIP4WIN.

RJD	Date UT	V	Mag	SD
4994	11 June 2009	23.50	2.56	
	(Very high air Mass)			
5022	10 July 2009	02.20	2.975	0.002
5023	11 July 2009	02:15	2.971	0.012
5031	19 July 2009	04.75	3.017	0.005
5032	20 July 2009	04.70	3.013	0.008
5033	21 July 2009	04.70	2.939	0.005
5034	22 July 2009	04.65	2.927	0.008
5035	23 July 2009	04.65	2.994	0.012
5036	24 July 2009	04.65	2.904	0.008
5037	25 July 2009	04.60	3.008	0.015
5038	26 July 2009	05.05	3.012	0.007
5039	27 July 2009	05.10	3.008	0.005
5040	28 July 2009	05.10	3.017	0.008
5041	29 July 2009	05.10	3.008	0.007
5042	30 July 2009	05.10	3.047	0.007
5043	31 July 2009	05.10	3.015	0.011
5044.713	01 August 2009	-	2.992	0.005
5045.713	02 August 2009	-	2.992	0.007
5046.715	03 August 2009	-	3.017	0.008
5048.715	05 August 2009	-	3.009	0.008
5049.715	06 August 2009	-	3.008	0.004
5051.715	08 August 2009	-	3.006	0.005
5052.715	09 August 2009	-	2.980	0.007
5053.715	10 August 2009	-	2.992	0.004
5054.715	11 August 2009	-	3.001	0.007
5055.715	12 August 2009	-	3.009	0.005
5056.717	13 August 2009	-	3.002	0.002
5057.717	14 August 2009	-	3.005	0.003
5063.485	20 August 2009	-	2.931	0.007
5065.510	22 August 2009	-	2.974	0.004
5068.521	25 August 2009	-	3.025	0.014
5071.652	28 August 2009	-	3.046	0.005
5072.656	29 August 2009	-	3.052	0.006
5079.535	05 September 2009	-	3.053	0.004
5083.502	09 September 2009	-	3.072	0.007
5084.51	10 September 2009	-	3.096	0.004
5086.633	12 September 2009	-	3.127	0.007
5092.652	18 September 2009	-	3.171	0.003
5094.502	20 September 2009	-	3.180	0.001
5096.642	22 September 2009	-	3.212	0.005
5105.619	01 October 2009	-	3.277	0.012
5108.481	03 October 2009	-	3.311	0.024
5108.529	04 October 2009	-	3.311	0.016
5109.515	04/05 October 2009	-	3.321	0.008
5111.471	06/07 October 2009	-	3.298	0.005

JD = 2,450,000 + RJD

Des Loughney (Continued)

RJD	Date UT		V Mag	SD
5112.479	07/08 October 2009	-	3.307	0.004
5116.475	11/12 October 2009	-	3.353	0.014
5120.629	15/16 October 2009	-	3.388	0.016
5121.502	16/17 October 2009	-	3.375	0.013
5122.685	17/18 October 2009	-	3.350	0.016
5127.708	22/23 October 2009	-	3.390	0.013
5128.521	23/24 October 2009	-	3.382	0.006
5130.492	25/26 October 2009	-	3.421	0.012
5139.517	03/04 November 2009	-	3.446	0.001
5141.496	05/06 November 2009	-	3.438	0.003
5142.646	06/07 November 2009	-	3.459	0.020
5144.494	08/09 November 2009	-	3.470	0.010
5147.421	11/12 November 2009	-	3.429	0.026
5150.556	14/15 November 2009	-	3.478	0.009
5153.346	17/18 November 2009	-	3.442	0.008
5156.446	20/21 November 2009	-	3.466	0.003
5157.385	21/22 November 2009	-	3.457	0.003

JD = 2,450,000 + RJD

Tom Pearson
Virginia Beach, Virginia USA
DSLR Canon 20 D , 400 ISO, f5.6, 58 mm lens/70 mm FL,
Exposure 5 seconds 30 Images Stacked

RJD	UT Date	UT	V Mag	SD	X
5059.8604	15/16 August 2009	08:42	3.066	0.011	1.4228
5063.8694	19/20 August 2009	08:52	3.039	0.050	1.2719
5065.8063	21/22 August 2009	07:21	2.92	0.092	1.6550
5068.8715	24/25 August 2009	08:55	3.083	0.057	1.2074
5070.8736	26/27 August 2009	08:58	3.043	0.030	1.1808
5073.8806	29/30 August 2009	08:58	3.098	0.022	1.1345
5079.8896	04/05 September 2009	09:21	3.105	0.014	1.0757
5086.8833	11/12 September 2009	09:12	3.097	0.050	1.0536
5088.8354	13/14 September 2009	08:03	3.213	0.049	1.1464
5094.8764	19/20 September 2009	09:02	3.183	0.032	1.0339
5103.8910	28/29 September 2009	09:23	3.278	0.052	1.0089
5104.6638	29/30 September 2009	08:07	3.300	0.066	1.0477
5108.9076	03/04 October 2009	09:47	3.389	0.031	1.0144
5124.8813	19/20 October 2009	09:09	3.437	0.001	1.0274
5125.8806	20/21 October 2009	09:08	3.419	0.011	1.0295
5138.8715	02/03 November 2009	09:55	3.418	0.019	1.1662
5144.9264	08/09 November 2009	10:14	3.431	0.023	1.5329
5151.9424	15/16 November 2009	10:37	3.472	0.024	1.8839

JD = 2,450,000 + RJD

Hans-Goran Lindberg
Skultuna, Sweden
Observation using:
(50 mm fl camera lens, HX-516 B/W Camera, y2-filter
Exp 30*3 sec, .fits images stacked
TeleAuto software, with Superstar)
Comp star lambda Aurigae at V= 4.71

Date	RJD	CV
19/20 July 2009	5033.4503	3.02
04/05 August 2009	5049.4653	3.03
05/06 August 2009	5050.4944	3.02
07/08 August 2009	5052.4958	3.03
08/09 August 2009	5053.4792	3.03
23/24 August 2009	5068.4799	3.05
29/30 August 2009	5074.4167	3.09
09/10 September 2009	5084.4472	3.11
14/15 September 2009	5089.3750	3.14
16/17 September 2009	5091.4028	3.19

JD = 2,450,000 + RJD

Thomas Karisson
Varberg Observatory
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
07 August 2009	5051.4160	2.990	0.010
10 September 2009	5085.4236	3.152	0.031
13 September 2009	5088.4028	3.172	0.042
14 September 2009	5089.4194	3.146	0.044
15 September 2009	5090.4229	3.144	0.024
16 September 2009	5091.4028	3.155	0.060
17 September 2009	5092.4271	3.149	0.049
18 September 2009	5093.4201	3.177	0.008
29/30 September 2009	5101.4118	3.258	0.021
02/03 October 2009	5107.4410	3.288	0.013
05/06 October 2009	5110.4271	3.286	0.023
12/13 October 2009	5117.4042	3.328	0.011
13/14 October 2009	5118.4083	3.344	0.008
14/15 October 2009	5119.3896	3.335	0.021
15/16 October 2009	5120.3868	3.356	0.023
17/18 October 2009	5122.3938	3.348	0.015
20/21 October 2009	5125.4036	3.353	0.005
21/22 October 2009	5126.3931	3.346	0.031
27/28 October 2009	5132.4410	3.377	0.007
30/31 October 2009	5135.3368	3.397	0.015
17/18 November 2009	5153.4514	3.443	0.015
18/19 November 2009	5154.4514	3.417	0.004

JD = 2,450,000 + RJD

Brian E. McCandless, Grand View Observatory
Elkton, MD USA
Telescope: CGE1400
Detector *(BVRI): SSP-3 Detector (JH): SSP-4 @ T= - 40C
Comp = Lam Aur HD34411
Note: B= 5.34 V= 4.71 R= 4.19 I= 3.88 J= 3.62 H= 3.33

UT Date	RJD	B	SD	V	SD	Rj	SD	Ij	SD
21 Nov 09	5156.6014	4.021	0.005	3.438	0.004	2.938	0.004	2.569	0.003
14 Nov 09	5144.5847	4.008	0.012	3.418	0.008	2.911	0.005	2.555	0.006
06 Nov 09	5142.6486	3.996	0.007	3.410	0.004	2.895	0.003	2.500	0.002
21 Oct 09	5125.6987	3.956	0.010	3.353	0.005	2.823	0.007	2.449	0.006
20 Oct 09	5124.8071	-	-	3.374	0.002	2.867	0.002	-	-
01 Oct 09	5105.7700	-	-	3.251	0.009	2.764	0.006	-	-
28 Sep 09	5102.8452	-	-	3.253	0.008	2.719	0.007	-	-
19 Sep 09	5093.7929	3.812	0.015	3.173	0.006	2.651	0.002	2.270	0.005
14 Sep 09	5088.8554	3.756	0.002	3.147	0.004	2.620	0.002	2.252	0.003
06 Sep 09	5080.7763	-	-	3.022	0.007	2.551	0.002	2.172	0.008
02 Sep 09	5076.8729	3.689	0.003	3.054	0.003	2.547	0.004	2.184	0.003
01 Sep 09	5075.8771	3.626	0.003	3.066	0.002	2.553	0.002	2.172	0.002
26 Aug 09	5069.8387	-	-	2.978	0.002	2.514	0.004	-	-

UT Date	RJD	H	SD	J	SD
06 Nov 09	2142.6194	1.996	0.006	2.226	0.010
20 Oct 09	5124.7466	1.899	0.007	2.154	0.006
19 Sep 09	5093.8500	1.760	0.005	2.018	0.010
14 Sep 09	5088.8012	1.760	0.010	2.032	0.020
06-Sep 09	5080.7988	1.701	0.011	1.987	0.015
02-Sep 09	5076.8292	1.694	0.011	1.952	0.005
01-Sep 09	5075.8429	1.682	0.002	1.935	0.005
26-Aug 09	5069.8800	1.555	0.018	1.781	0.040

JD = 2,450,000 + RJD

Filter properties, comparison star and check star magnitudes.

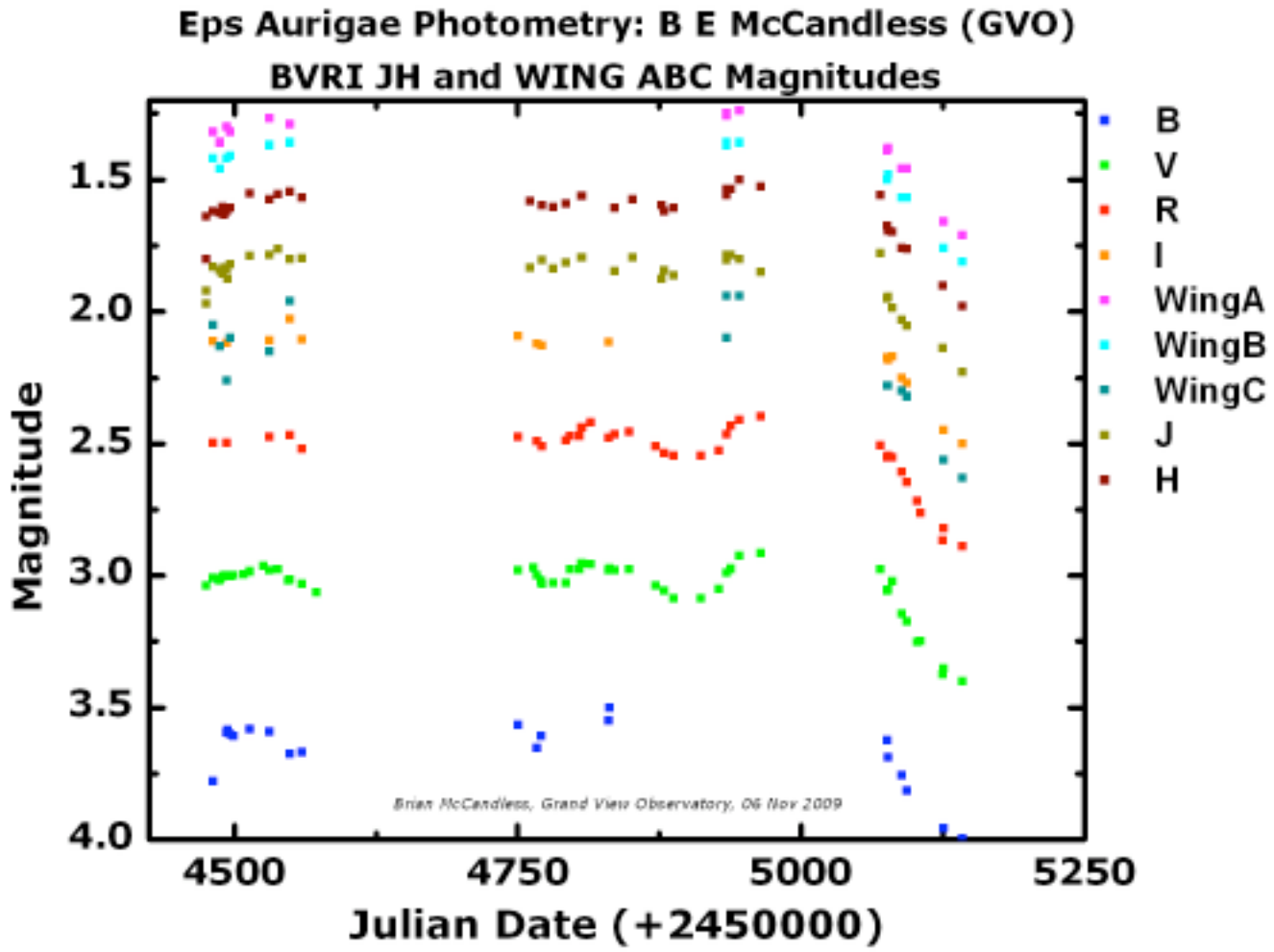
Filter	Central λ (nm)	Band Pass (nm)	λ Aur Mag	HD32655 Mag	δ Aur Mag
B	440	100	5.34	6.63	4.94
V	540	95	4.71	6.26	3.72
Rj	650	180	4.19	5.77	-
WA	712	11	3.01	-	1.79
WB	754	11	3.11	-	1.82
Ij	880	280	3.88	5.47	-
WC	1025	42	4.04	-	2.42
J	1250	200	3.62	5.17	2.04
H	1650	300	3.33	5.02	1.52

Collected photometry in Wing A, B and C bands (band passes at 712, 754 and 1025 nm). Motivation for this:

1) detection of possible TiO, VO and C content in “companion cloud system”

2) continuum values in the far-red and NIR. Recent values are compared here to values from 23 April 09 (2454945):

```
2455142.7: WA= 1.71 ±0.01; WB= 1.81 ±0.01; WC= 2.63 ±0.01; WB-WC= -0.82
2455125.7: WA= 1.66 ±0.01; WB= 1.76 ±0.01; WC= 2.56 ±0.01; WB-WC= -0.60
2455093.8: WA= 1.45 ±0.01; WB= 1.57 ±0.01; WC= 2.36 ±0.01: WB-WC= -0.79
2455088.8: WA= 1.46 ±0.01; WB= 1.57 ±0.01; WC= 2.30 ±0.01; WB-WC= -0.73
2455075.8: WA= 1.39 ±0.01; WB= 1.50 ±0.01; WC= 2.28 ±0.01; WB-WC= -0.78
2454945.6: WA= 1.24 ±0.01; WB= 1.36 ±0.01; WC= 1.94 ±0.01; WB-WC= -0.58
```



Jeff Hopkins
Hopkins Phoenix Observatory (HPO)
Phoenix, Arizona USA
Latitude: 33.5017 North , Longitude: 112.2228 West, Altitude: 1097 feet ASL
Time Zone: MST (UT -7)
Telescope: C-8 8" SCT , Filter Set: UBV Standard
Detector: 1P21 PMT in Photon Counting Mode
Differential Photometry
lambda Aurigae as Comparison star: V= 4.71; B= 5.34; U= 5.46
Data transformed and corrected for nightly extinction.

UT Date	RJD	U	SD	B	SD	V	SD
25/26 August 2009	5069.9433	3.6940	0.0156	3.6251	0.0069	3.0669	0.0030
28/29 August 2009	5072.9732	3.7242	0.0112	3.6359	0.0205	3.0811	0.0087
07/08 September 2009	5082.9565	3.7768	0.0135	3.6819	0.0021	3.1163	0.0074
14/15 September 2009	5089.9704	3.8572	0.0013	3.7416	0.0030	3.1707	0.0024
15/16 September 2009	5090.9774	3.8667	0.0011	3.7489	0.0008	3.1821	0.0022
17/18 September 2009	5092.9662	3.8933	0.0030	3.7622	0.0044	3.1944	0.0074
20/21 September 2009	5095.9753	3.9174	0.0072	3.7940	0.0030	3.2220	0.0019
21/22 September 2009	5096.9669	3.9356	0.0119	3.8033	0.0072	3.2351	0.0014
22/23 September 2009	5097.9655	3.9445	0.0086	3.8086	0.0018	3.2326	0.0036
24/25 September 2009	5099.9225	3.9466	0.0019	3.8238	0.0044	3.2460	0.0045
25/26 September 2009	5100.9774	3.9655	0.0150	3.8271	0.0080	3.2476	0.0030
27/28 September 2009	5102.9308	3.9741	0.0032	3.8478	0.0049	3.2718	0.0042
30 Sept/01 Oct 2009	5105.9322	3.9817	0.0170	3.8646	0.0028	3.2876	0.0033
03/04 October 2009	5108.9225	4.0211	0.0094	3.8793	0.0035	3.3028	0.0007
08/09 October 2009	5113.9392	4.0701	0.0061	3.9126	0.0034	3.3337	0.0044
17/18 October 2009	5122.8697	4.1207	0.0153	3.9561	0.0041	3.3715	0.0038
19/20 October 2009	5124.8496	4.1172	0.0069	3.9612	0.0052	3.3793	0.0054
23/24 October 2009	5128.8405	4.0931	0.0284	3.9642	0.0045	3.3815	0.0042
05/06 November 2009	5141.8051	4.1306	0.0258	3.9894	0.0030	3.4285	0.0067
08/09 November 2009	5144.8100	4.1299	0.0081	4.0029	0.0029	3.4449	0.0025
14/15 November 2009	5150.8030	4.1233	0.0122	4.0224	0.0058	3.4631	0.0049
15/16 November 2009	5151.8072	4.1485	0.0038	4.0248	0.0066	3.4686	0.0020
16/17 November 2009	5152.8086	4.1379	0.0149	4.0290	0.0007	3.4756	0.0012
17/18 November 2009	5153.8121	4.1236	0.0155	4.0340	0.0088	3.4769	0.0003
18/19 November 2009	5154.8024	4.1240	0.0155	4.0313	0.0020	3.4820	0.0019
19/20 November 2009	5155.8017	4.1396	0.0213	4.0326	0.0087	3.4770	0.0040
20/21 November 2009	5156.8072	4.1243	0.0328	4.0249	0.0156	3.4748	0.0132

JD = RJD + 2,450,000

Frank J. Melillo
Holtsville, NY USA
Lat:+ 40d 40' Long: 73 W Elevation: 100'
Instrument: Optec SSP-3, Telescope: C-8 8"
Gate Time: 10 Seconds

RJD	Date	UT	V Mag	#SD	
5058.8090	14/15 August 2009	07:25	2.973	12	0.017
5066.7951	22/23 August 2009	07:05	3.010	12	0.019
5073.8806	29/30 August 2009	08:58	3.098	12	0.022
5074.7639	30/31 August 2009	06:20	3.023	12	-
5080.7514	05/06 September 2009	06:28	3.044	12	0.012
5088.7361	13/14 September 2009	-	3.10	3-	
5092.7361	17/18 September 2009	05:40	3.14	12	0.02
5094.7500	19/20 September 2009	06:00	3.17	12	0.01
5100.7263	25/26 September 2009	05:30	3.20	12	0.01
5102.7263	27/28 September 2009	05:15	3.21	12	0.02
5106.7114	01/02 October 2009	04:40	3.25	12	0.019
5110.6982	05/06 October 2009	04:45	3.28	12	0.020
5116.7115	11/12 October 2009	05:05	3.32	12	0.019
5124.6699	19/20 October 2009	04:51	3.33	12	0.017
5130.6951	25/26 October 2009	03:40	3.37	16	0.019
5134.6559	29/30 October 2009	03:50	3.38	16	0.020
5139.7088	03/04 November 2009	08:00	3.40	16	0.022
5144.6515	08/09 November 2009	03:30	3.41	16	0.016
5153.7132	17/18 November 2009	05:05	3.44	16	0.026

JD = RJD + 2,450,000

Gerard Samolyk, Greenfield, Wisconsin, USA
Equipment, CCD Camera and Camera Lens, ST9XE + 50 mm lens

UT Date	RJD	V	SD	B	SD
26 July 2009	5038.8770	2.980	0.009	3.567	0.011
27 July 2009	5039.8840	2.955	0.013	3.560	0.015
28 July 2009	5040.8178	2.973	0.018	3.566	0.014
29 July 2009	5041.8184	2.976	0.009	3.566	0.013
31 July 2009	5043.8183	2.985	0.015	3.562	0.010
02 August 2009	5045.8605	2.970	0.008	3.539	0.017
12 August 2009	5055.8670	2.952	0.012	3.533	0.009
13 August 2009	5056.8689	2.978	0.005	3.532	0.017
15 August 2009	5058.8482	2.952	0.012	3.515	0.015
19 August 2009	5062.8575	2.995	0.019	3.542	0.015
23 August 2009	5066.8375	2.992	0.017	3.587	0.017
24 August 2009	5067.8512	3.003	0.005	3.597	0.016
31 August 2009	5074.8333	3.038	0.011	3.600	0.007
	5075.8293	3.049	0.013	3.619	0.013
	5076.8159	3.036	0.020	3.615	0.014
	5077.8389	3.026	0.017	3.616	0.020
	5078.8500	3.002	0.019	3.623	0.014
	5079.8741	3.054	0.008	3.627	0.019
	5082.8339	3.065	0.012	3.640	0.010
	5086.8186	3.071	0.012	3.684	0.018
	5087.8501	3.116	0.013	3.690	0.024
	5088.9027	3.149	0.013	3.724	0.014
	5089.8505	3.104	0.019	3.726	0.028
	5092.7804	3.154	0.010	3.736	0.018
	5093.8139	3.164	0.015	3.740	0.019
	5096.7917	3.159	0.017	3.755	0.021
	5101.8129	3.224	0.015	3.799	0.018
	5105.7878	3.238	0.012	3.841	0.012
	5112.7545	3.284	0.008	3.884	0.018
	5114.7949	3.291	0.016	3.880	0.014
	5115.7735	3.296	0.011	3.891	0.012
	5122.7456	3.340	0.011	3.933	0.012
	5124.6330	3.346	0.022	3.930	0.036
	5131.9432	3.387	0.007	3.954	0.013

JD = RJD + 2,450,000

Gary Frey, North Pines Observatory, Mayer, Arizona, USA
Latitude: +34d 23' 44", Longitude: W112d 14' 19", Elevation: 4530 Feet
Optec SSP-3, B, V, R, Integration Time: 10 Seconds, Telescope: 20/F10 Classical Cassegrain

UT Date	RJD	I	SD	R	SD	X
29/30 Jan 2009	4860.6510	2.088	.0055	2.529	.0027	1.0179
03/04 Feb 2009	4865.6168	2.102	.0056	2.533	.0014	1.0320
16/17 Feb 2009	4878.6610	2.160	.0064	2.593	.0018	1.0359
10/11 Mar 2009	4900.6392	2.152	.0020	2.592	.0029	1.1012
24/25 Mar 2009	4914.6417	2.162	.0052	2.606	.0073	1.2308
27/28 Mar 2009	4917.6470	2.165	.0023	2.606	.0022	1.2879
28/29 Mar 2009	4918.6412	2.163	.0015	2.617	.0014	1.2768

JD = RJD + 2,450,000

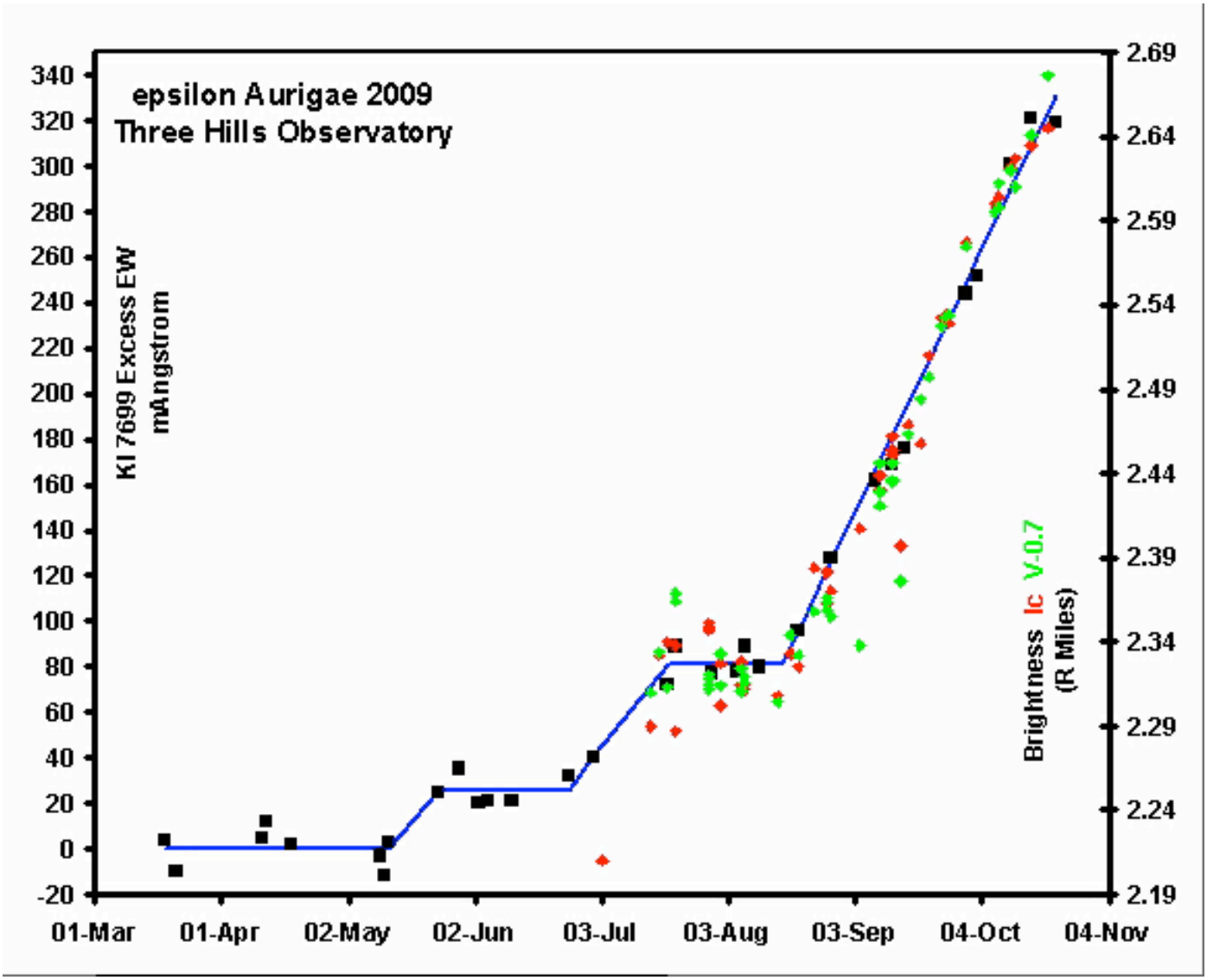
Spectroscopy Report

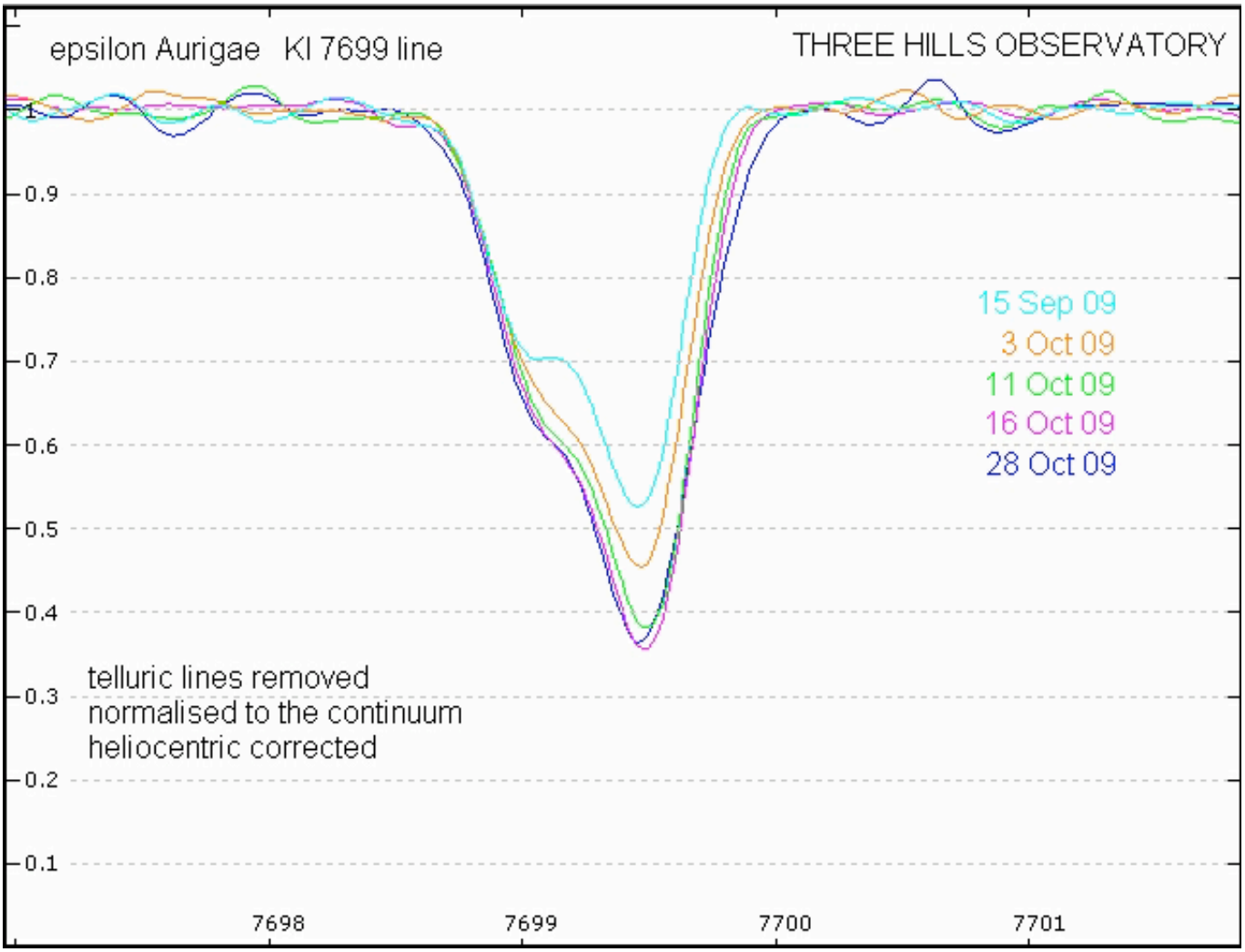
Robin Leadbeater Report
Location: Cubria, England
Equipment:

Telescope
Vixen VC200L Cassegrain, 200mm f 6.4/f9
Spectrographs
Star Analyser
Lhires III

October 23, 2009 10:25:50 AM GMT-07:0

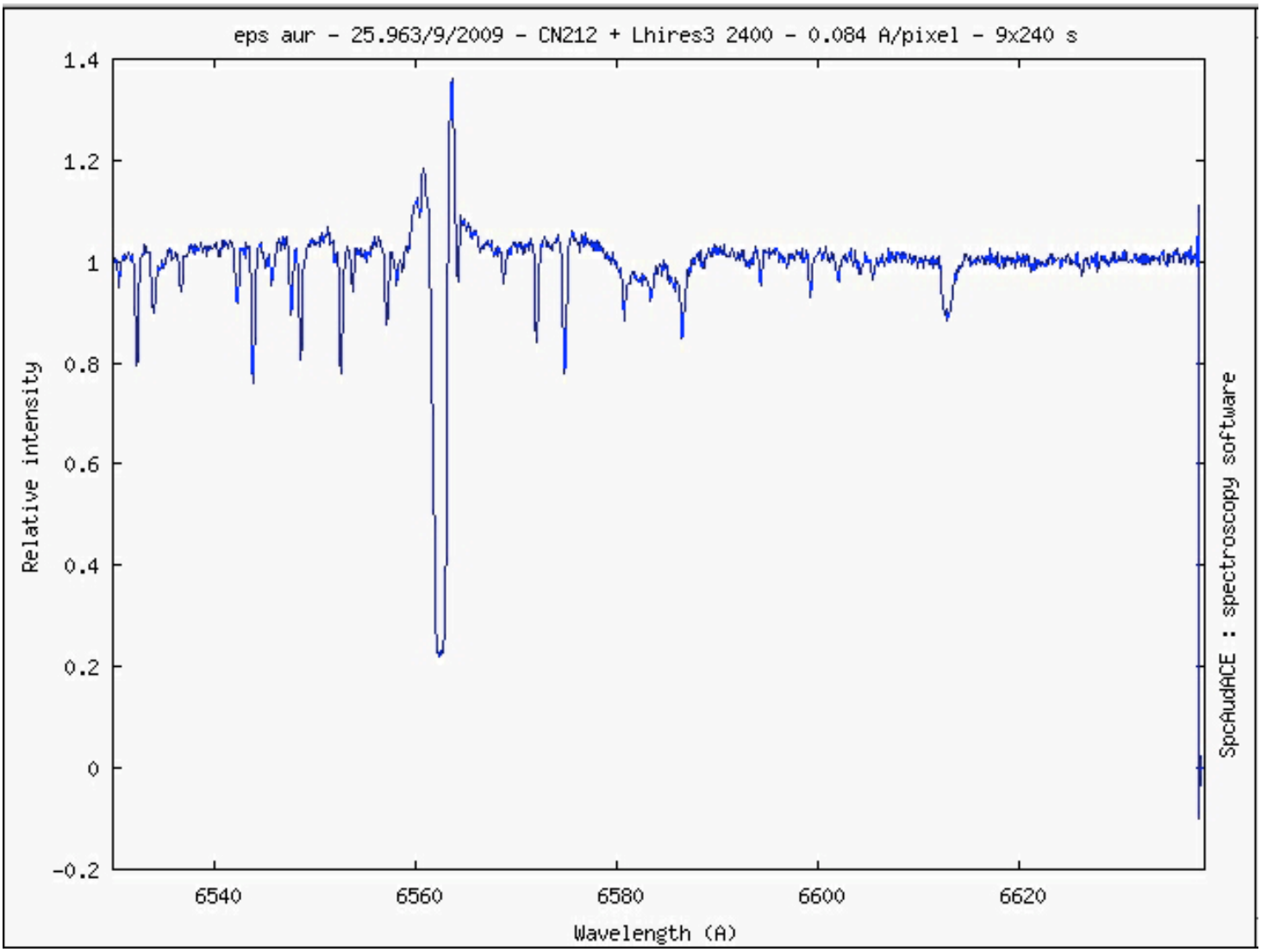
A couple more KI 7699 EW points added to the graph. Interestingly the values on 16th and 22nd were almost identical. Probably just noise though (one above and one below the trend line) Mind you the "gaps in the rings" or whatever they were should be rippling through the data again now as they exit the far side of the primary.



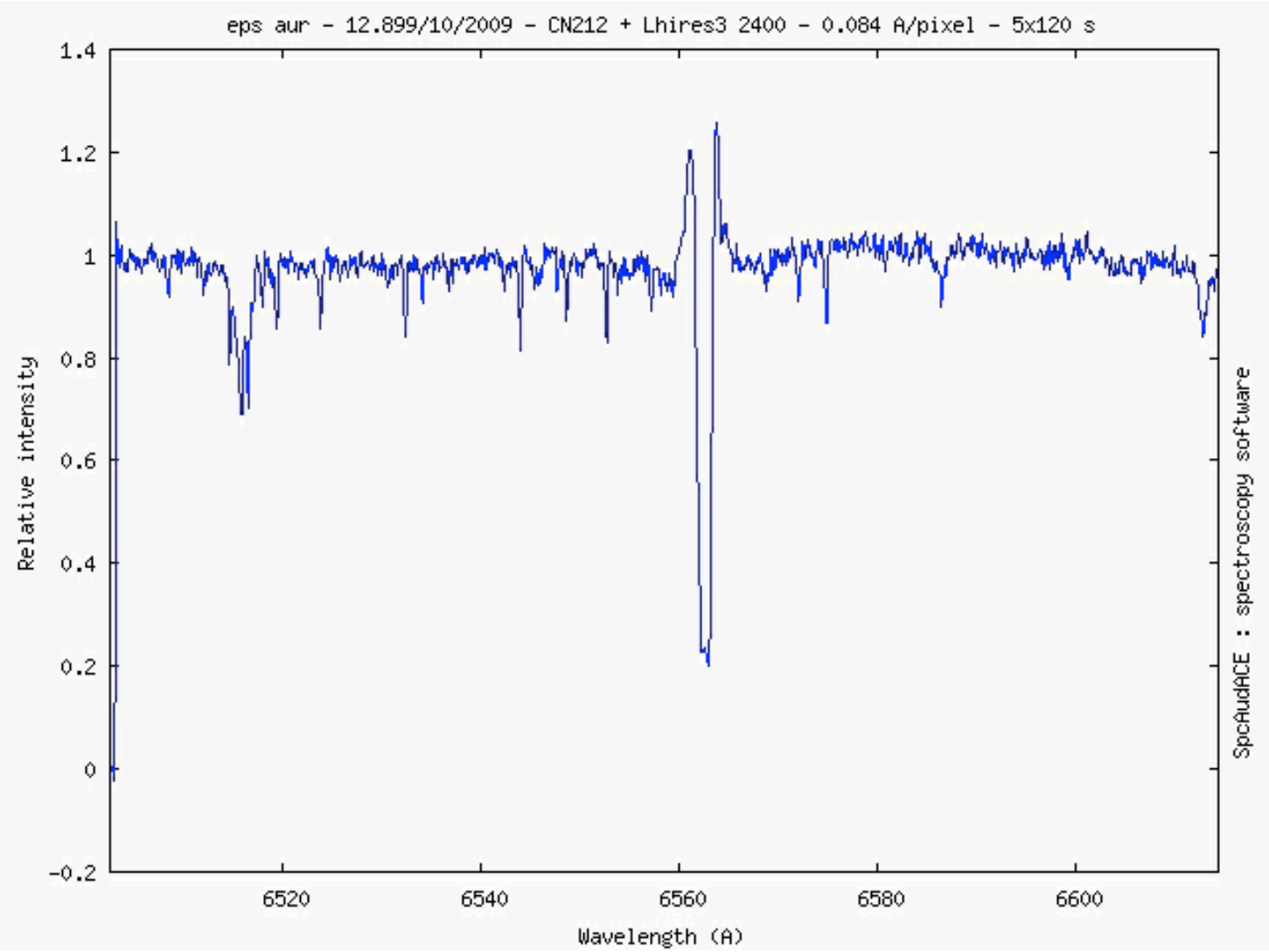

epsilon Aurigae KI 7699 line
THREE HILLS OBSERVATORY
15 Sep 09
3 Oct 09
11 Oct 09
16 Oct 09
28 Oct 09
telluric lines removed
normalised to the continuum
heliocentric corrected
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
7698
7699
7700
7701

Thierry Garrel, Observatoire de Foncaude
Juvignac, France
Telescope Type: CN212 Takshashi, 212 mm, 12,4/3,99
Cassegrain/Newtonian
Instrument/Detector: Spectrometer
Lhires III 2400 l/mm, Star Analyser100
Atik 314L+, cooled camera based on sony285 CCD

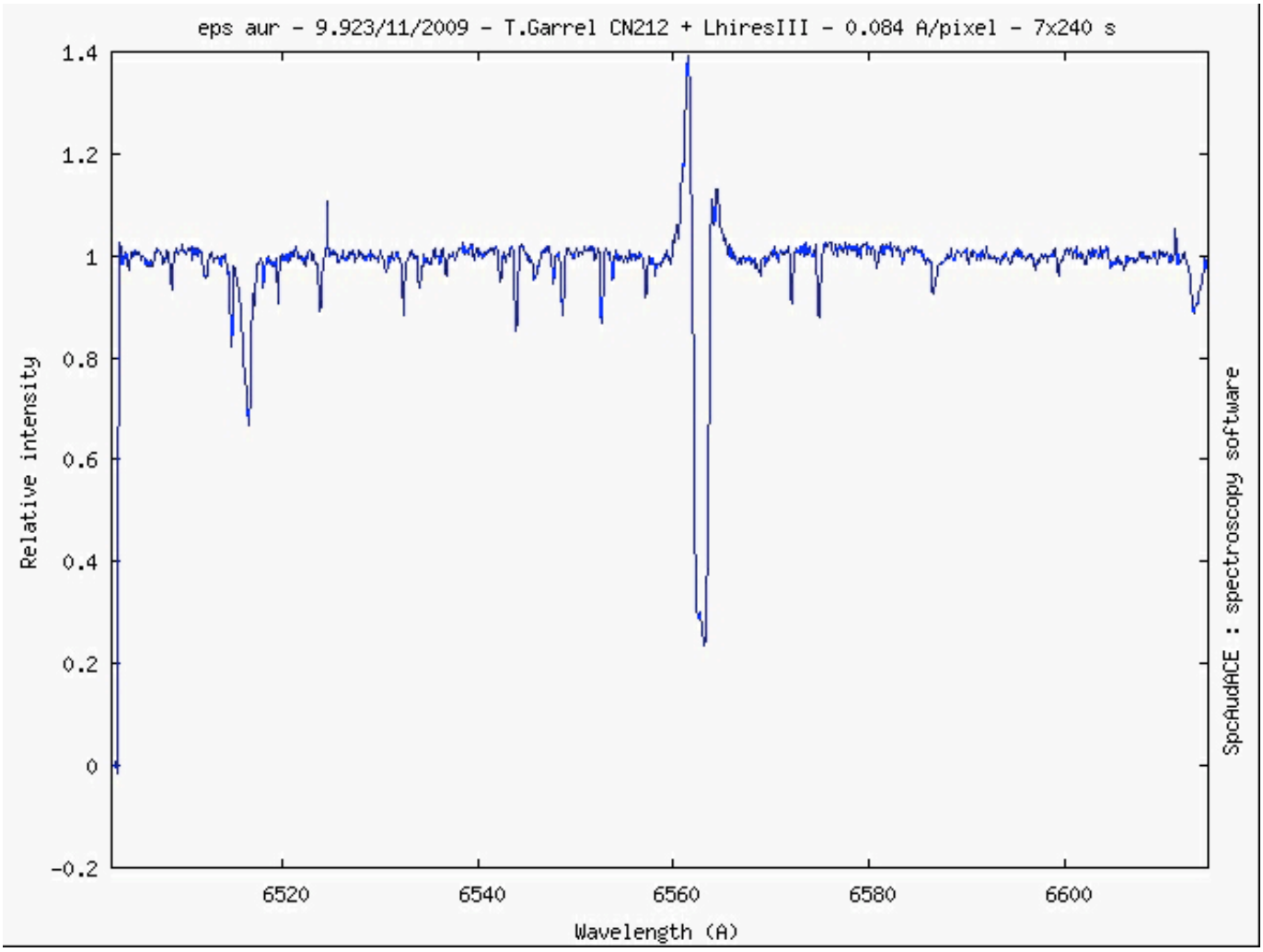
Hydrogen Alpha Spectrum Profile 25 September 2009

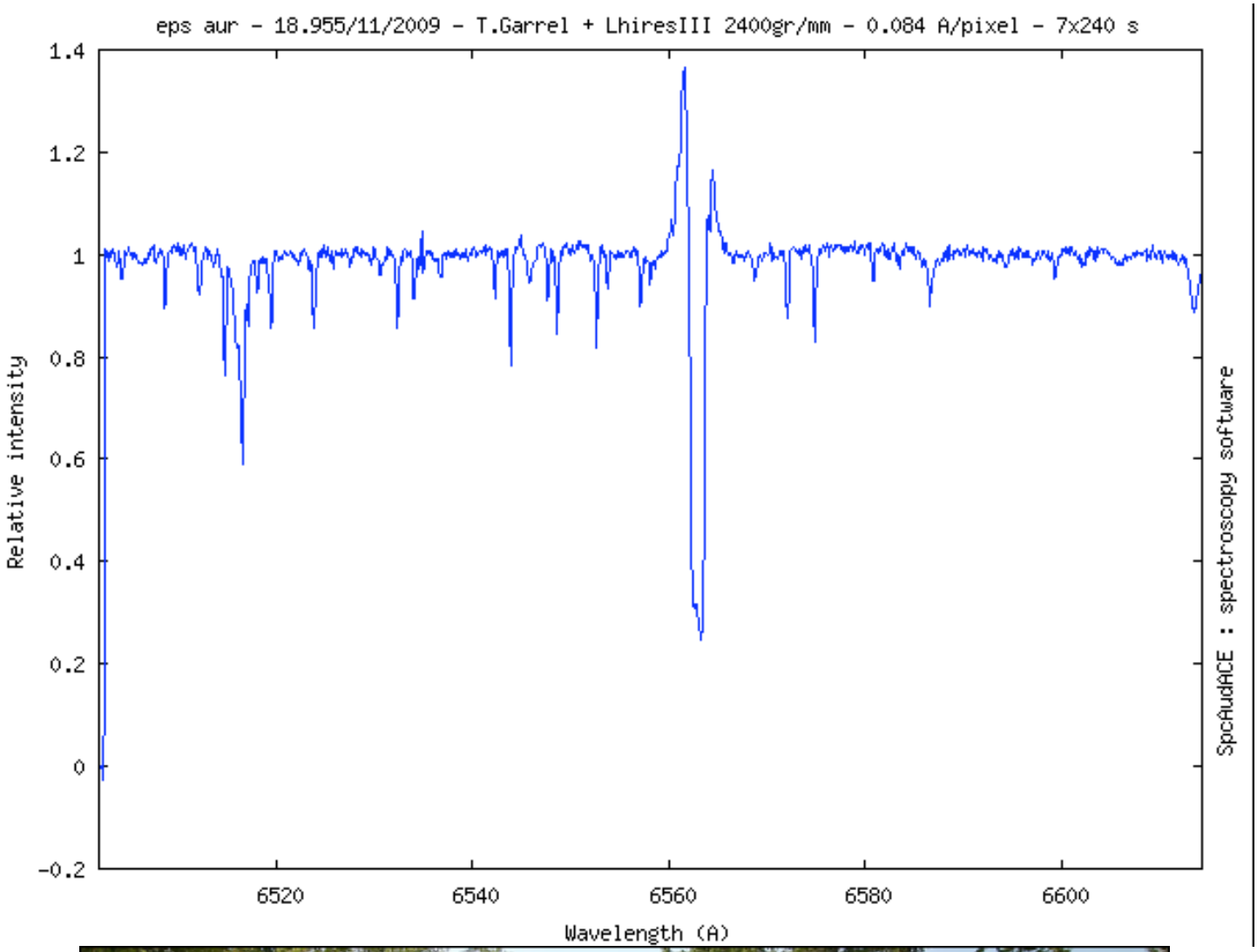


Hydrogen Alpha Spectrum Profile 12 October 2009



Hydrogen Alpha Spectrum Profile 09 November 2009




eps aur - 18.955/11/2009 - T.Garrel + LhiresIII 2400gr/mm - 0.084 A/pixel - 7x240 s
Relative intensity
Wavelength (A)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
6520
6540
6560
6580
6600
SpcAudACE : spectroscopy software

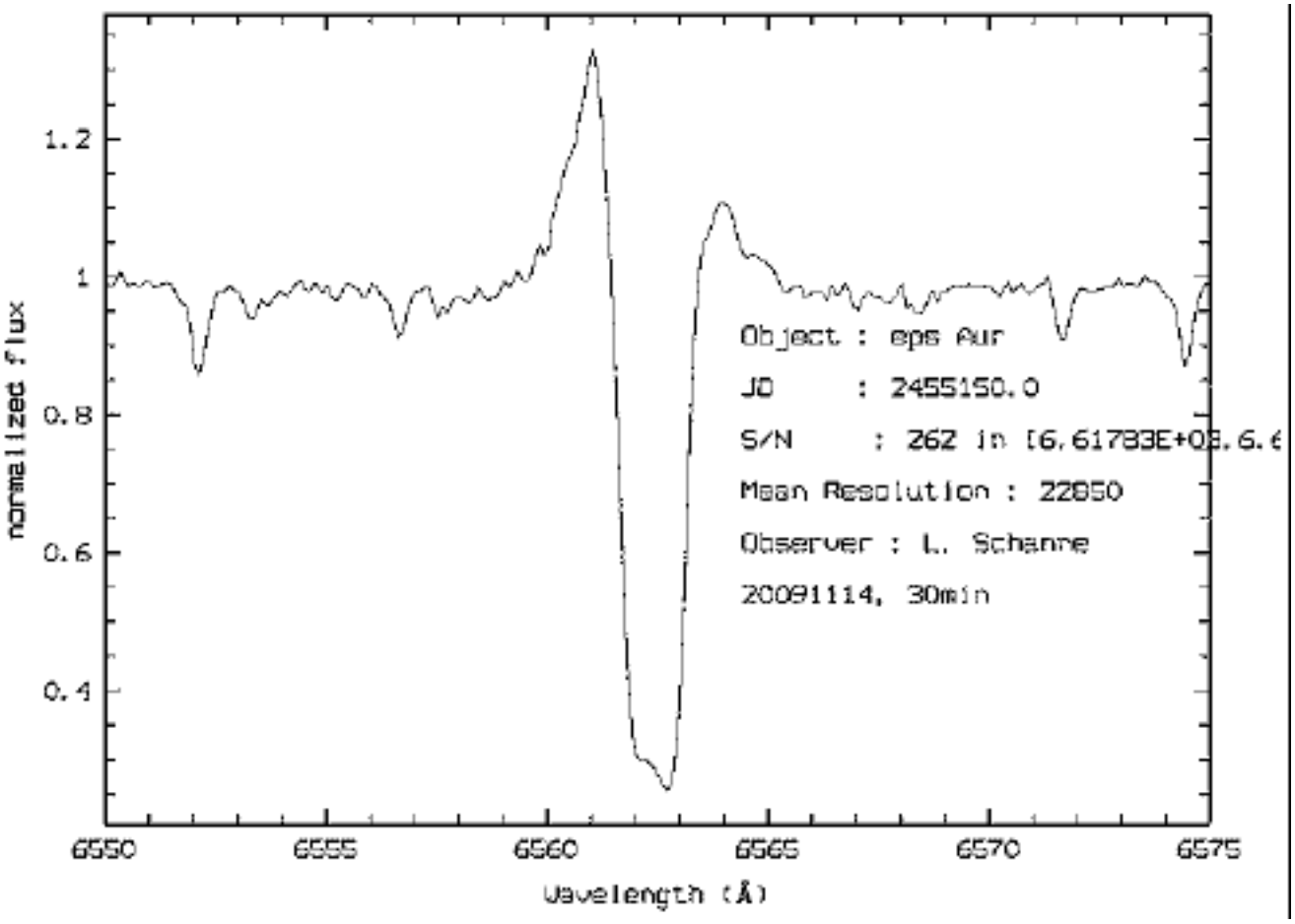
Lothar Schanne
Völklingen, Deutschland Germany

From an email of 14 November 2009 regarding the spectrum of epsilon Aurigae in the sodium D line region: There is no change to see up till now in equivalent width EW or line profile (the resolution of my apparatus is about 0.5Å). I think that's pure interstellar Na.

Lothar Schanne, 20091114, OSSV (Observatory for Star Spectroscopy Voelkingen)
Results of spectroscopic measurements by Lhires III on the Na D lines in the optical spectrum.

Epsilon Aurigae

Date	5889 □		5896 □	
	FWHM	EW	FWHM	EW
26 April 2008	1.18	1.11	0.98	0.91
08 December 2008	1.06	0.87	1.05	0.79
29 July 2009	1.00	0.99	1.00	0.96
17 August 2009	0.95	1.01	0.86	0.97
23 August 2009	1.08	0.97	1.07	0.99
30 October 2009	0.95	1.04	0.90	0.99



Christian Buil, France

From email of 15 November 2009

The following spectra were taken 12 November 2009 with an eShel spectrograph, R=11,000.

Note moderate change for the Halpha line between October 10, 2009 and November 12, 2009 spectra, but significant evolution are noticed for some lines.

Example: Features near 6.491.9 Å and 6479.1 Å (any idea about chemical elements?)

Also an enlarged view of Hbeta line, stable, but note fast change on many profile lines.

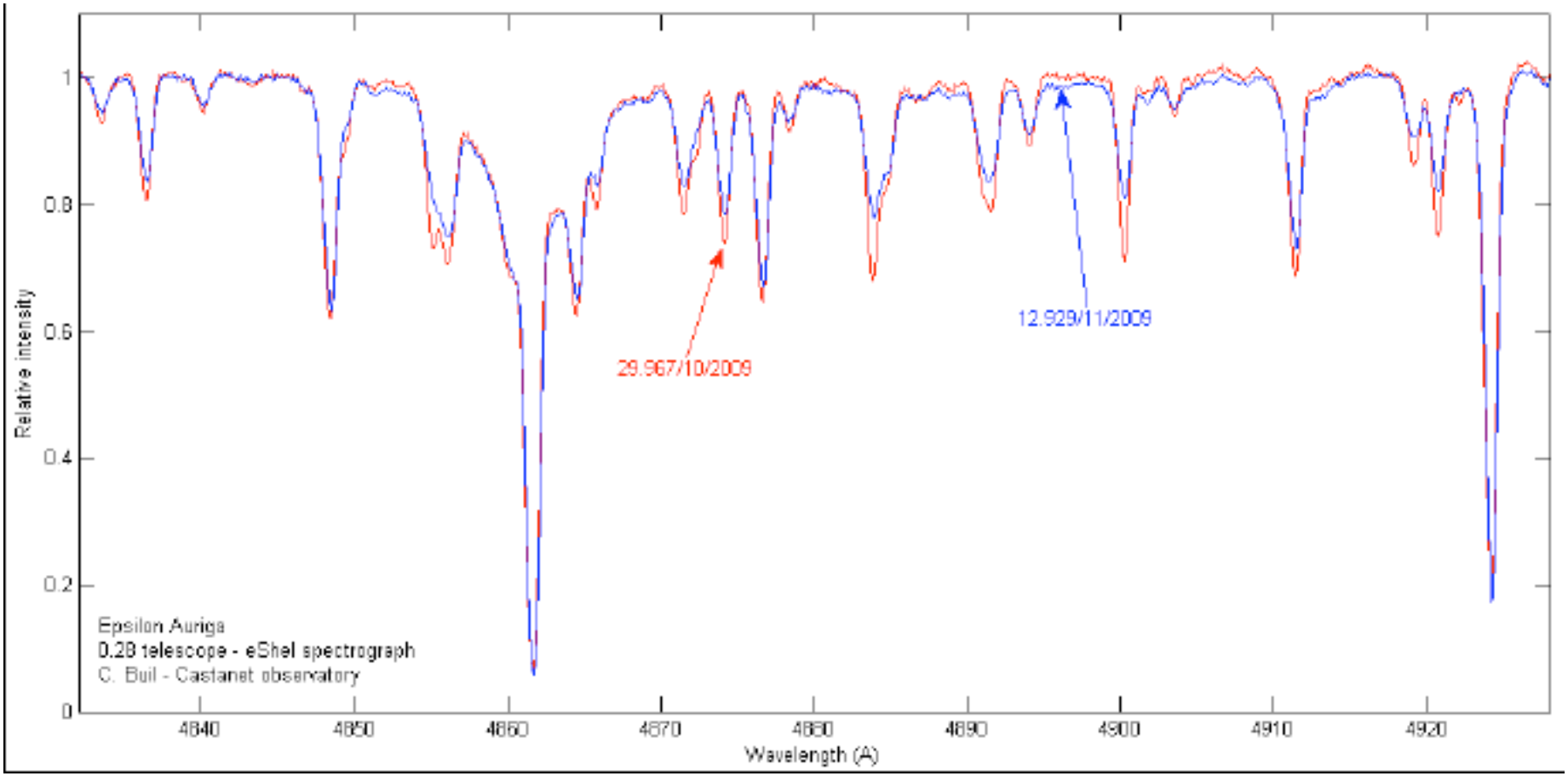
Instrument: 0.28 m telescope (Celestron 11) + eShel spectrograph (R=11000) + QSI532 CCD camera (CCD KAF3200ME)

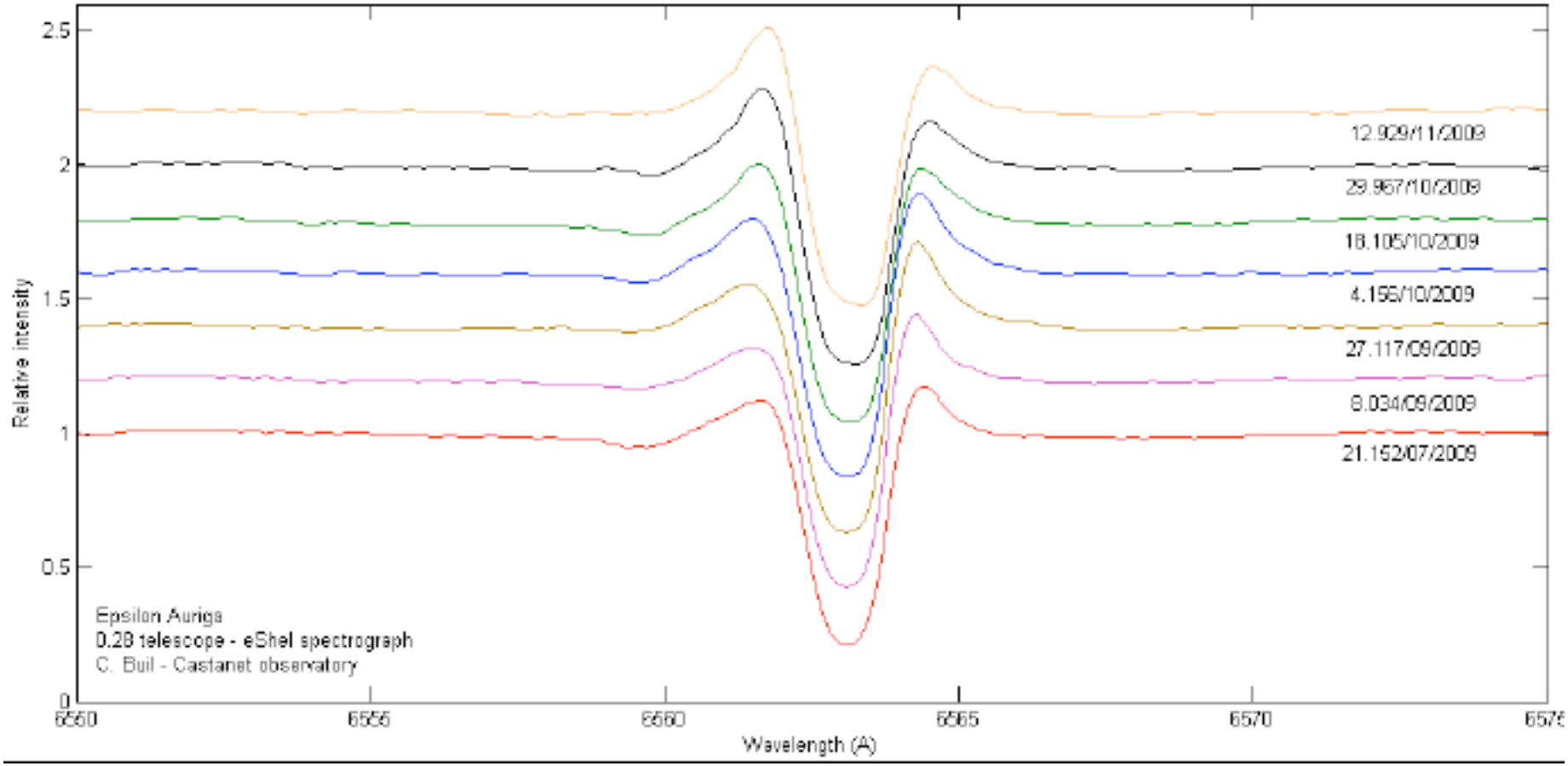
Observatory: Castanet-Tolosan (France)

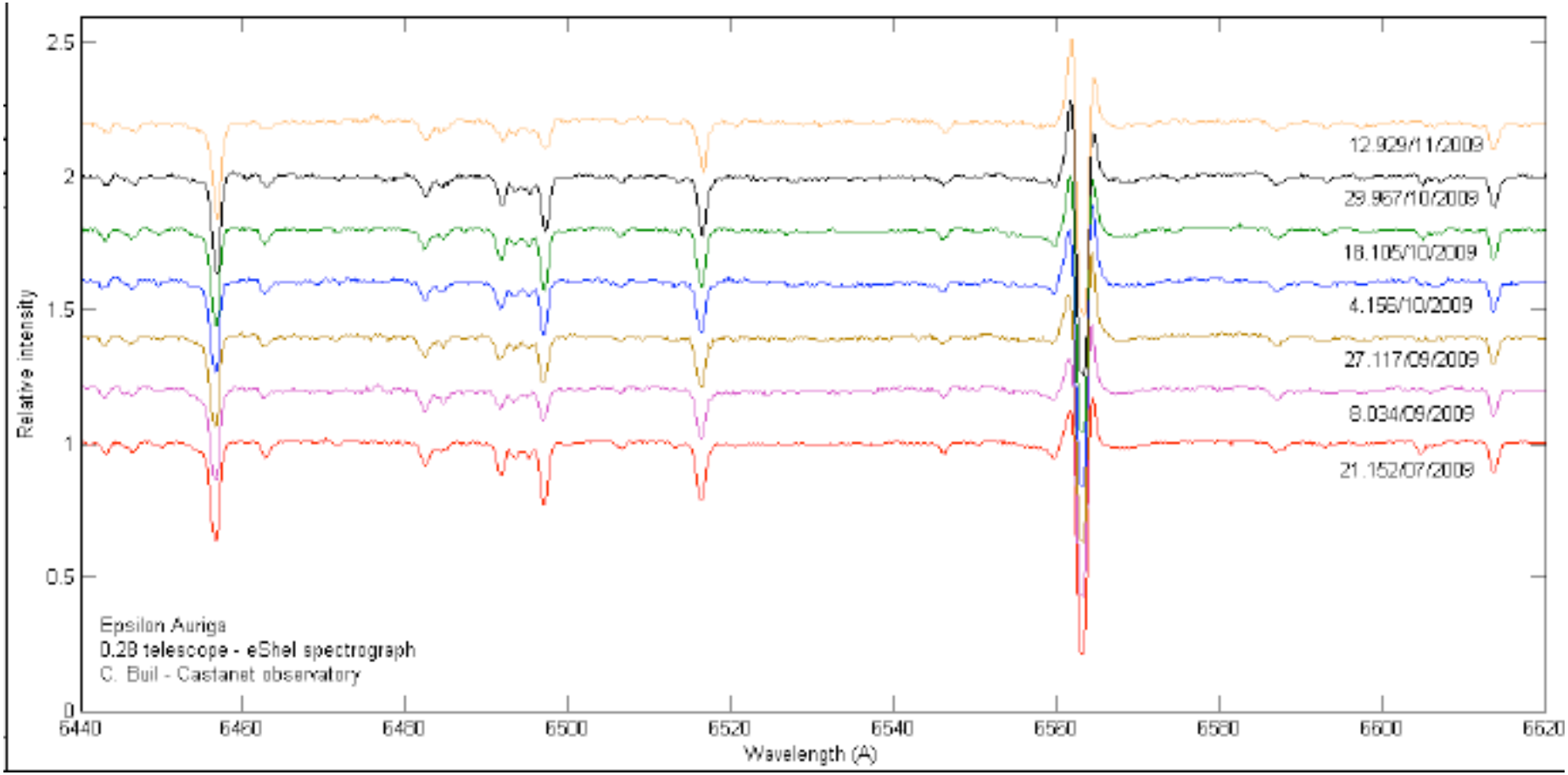
Observer: C. Buil

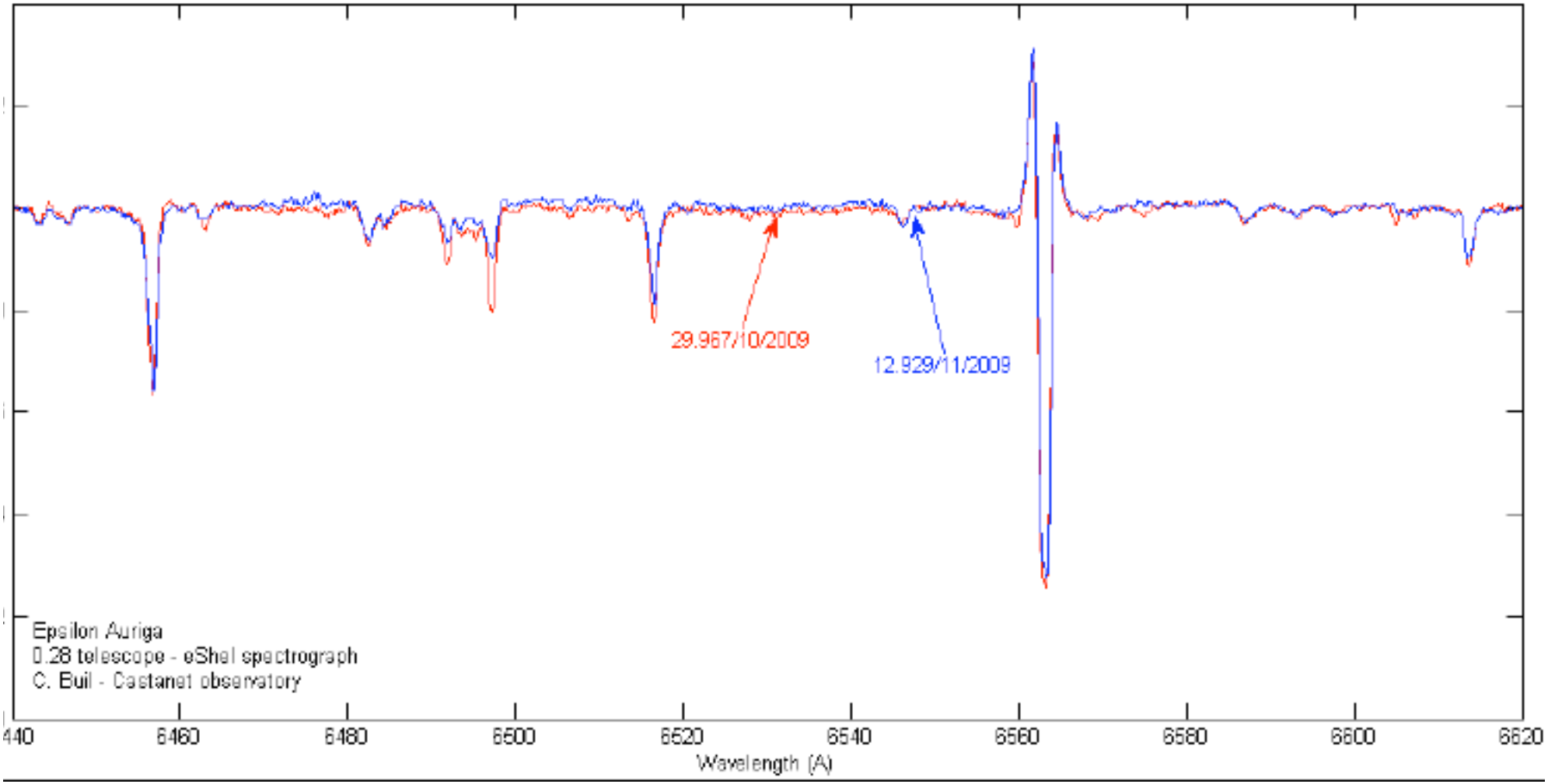
Processing: standard échelle pipeline (Reshel software V1.11). H2O telluric lines are removed (division by a synthetic H2O spectrum by using Vspec software - the telluric lines list is from GEISA database (LMD/CNRS)).

The diurnal and annual earth velocity are corrected (the spectra wavelength are given in an heliocentric reference for a standard atmosphere). For the plots, the continuum is normalized and vertically shifted between each spectrum for clarity. Date are given in UT.


Relative intensity
Wavelength (A)
29.967/10/2009
12.929/11/2009
Epsilon Auriga
0.2B telescope - eShel spectrograph
C. Buil - Castanet observatory


Relative intensity
Wavelength (A)
12.929/11/2009
29.957/10/2009
18.105/10/2009
4.156/10/2009
27.117/09/2009
8.034/09/2009
21.152/07/2009
Epsilon Auriga
0.28 telescope - eShel spectrograph
C. Buil - Castanet observatory


Relative intensity
Wavelength (A)
12.929/11/2009
29.967/10/2009
18.105/10/2009
4.156/10/2009
27.117/09/2009
8.034/09/2009
21.152/07/2009
Epsilon Auriga
0.2B telescope - eShel spectrograph
C. Buil - Castanet observatory

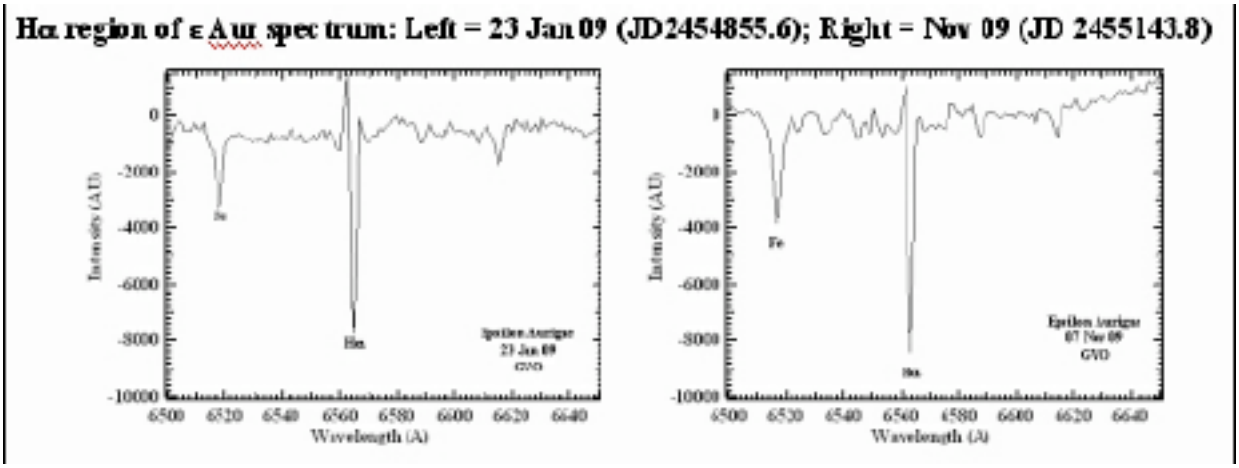

29.967/10/2009
12.929/11/2009
Epsilon Auriga
0.28 telescope - eShel spectrograph
C. Buil - Castanet observatory
6440
6460
6480
6500
6520
6540
6560
6580
6600
6620
Wavelength (A)

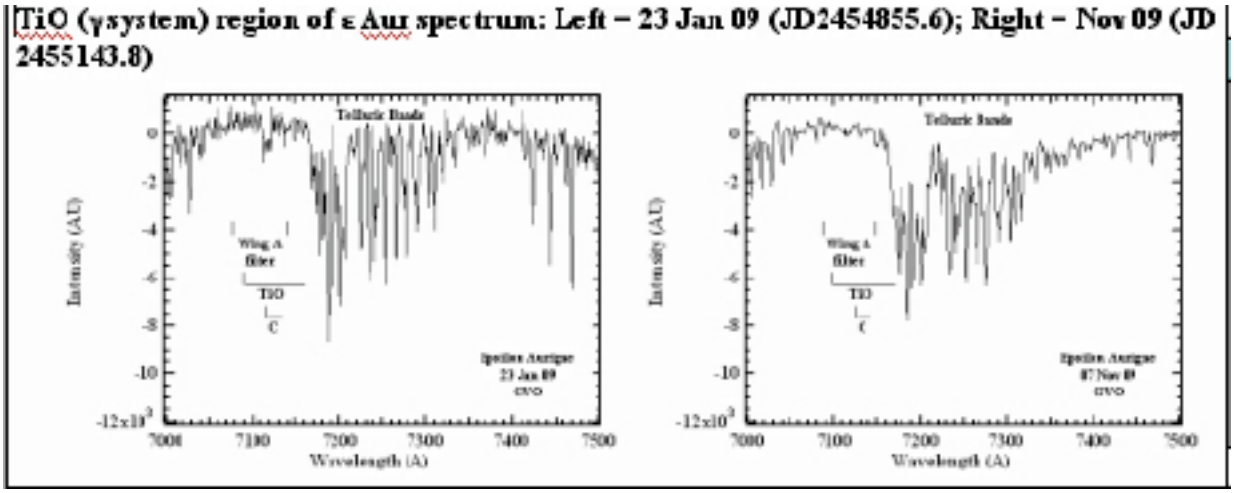
Brian E. McCandless, Grand View Observatory
Elkton, MD USA
Site: Lon N39° 36.390; Lat W75° 50.223 ; Elev 7 m

Equipment:
Celestron CGE1400 (35cm f/10)
SBIG SGS spectrograph with ST7XME CCD camera
(Operates at f/6.3, 400-800 nm spectral range, grating 600 l/mm, dispersion = 0.107 nm/pixel, R = 0.22 nm at 650 nm, R ~ 3000)

Spectrographic Observation and Reduction

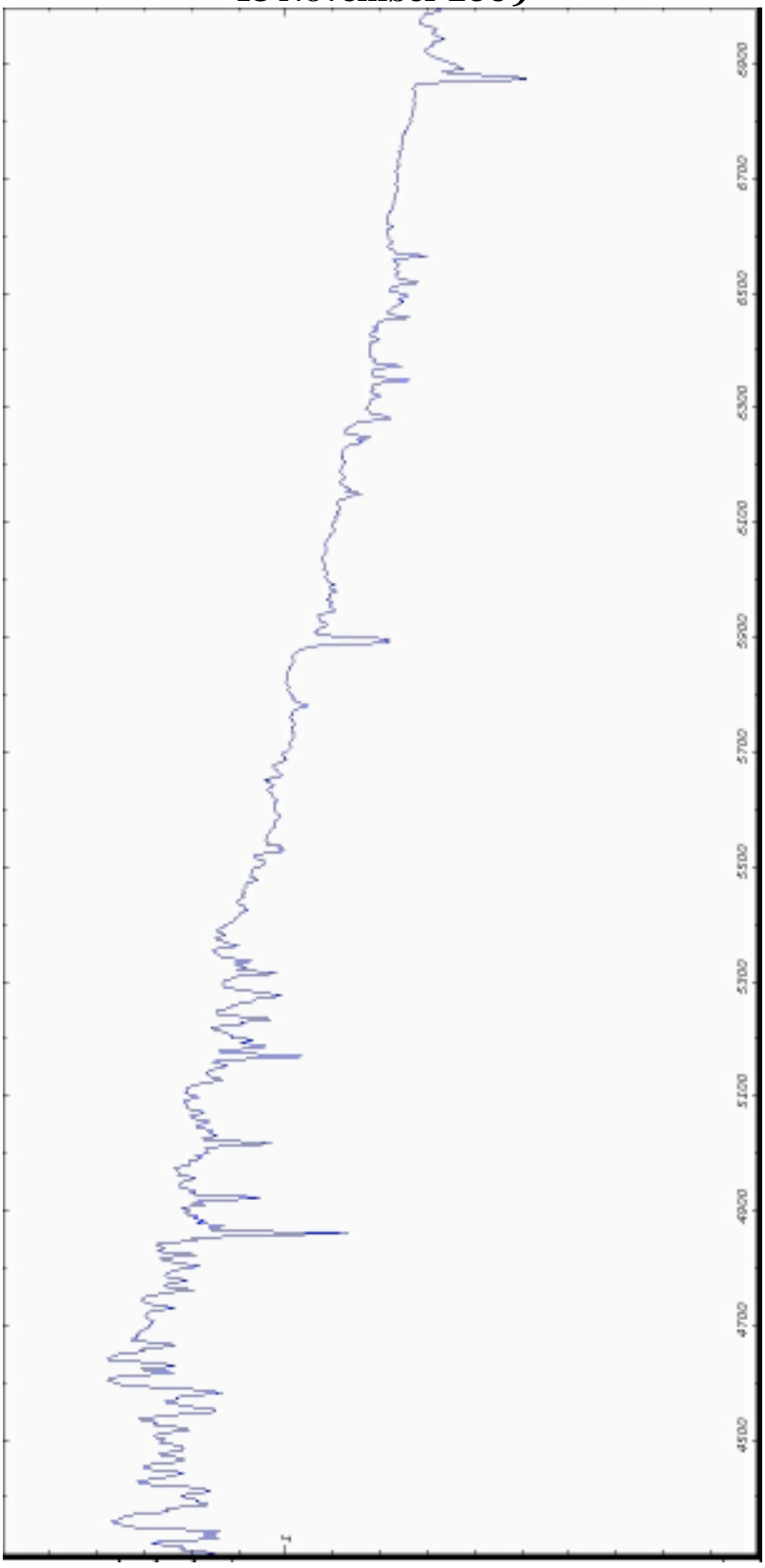
Epsilon Aurigae spectra centered near hydrogen alpha are obtained with exposures ranging from 120 to 300 sec, depending on conditions (seeing, tracking, etc.). As time allows, spectra are also taken in the far-red (700-770 nm).





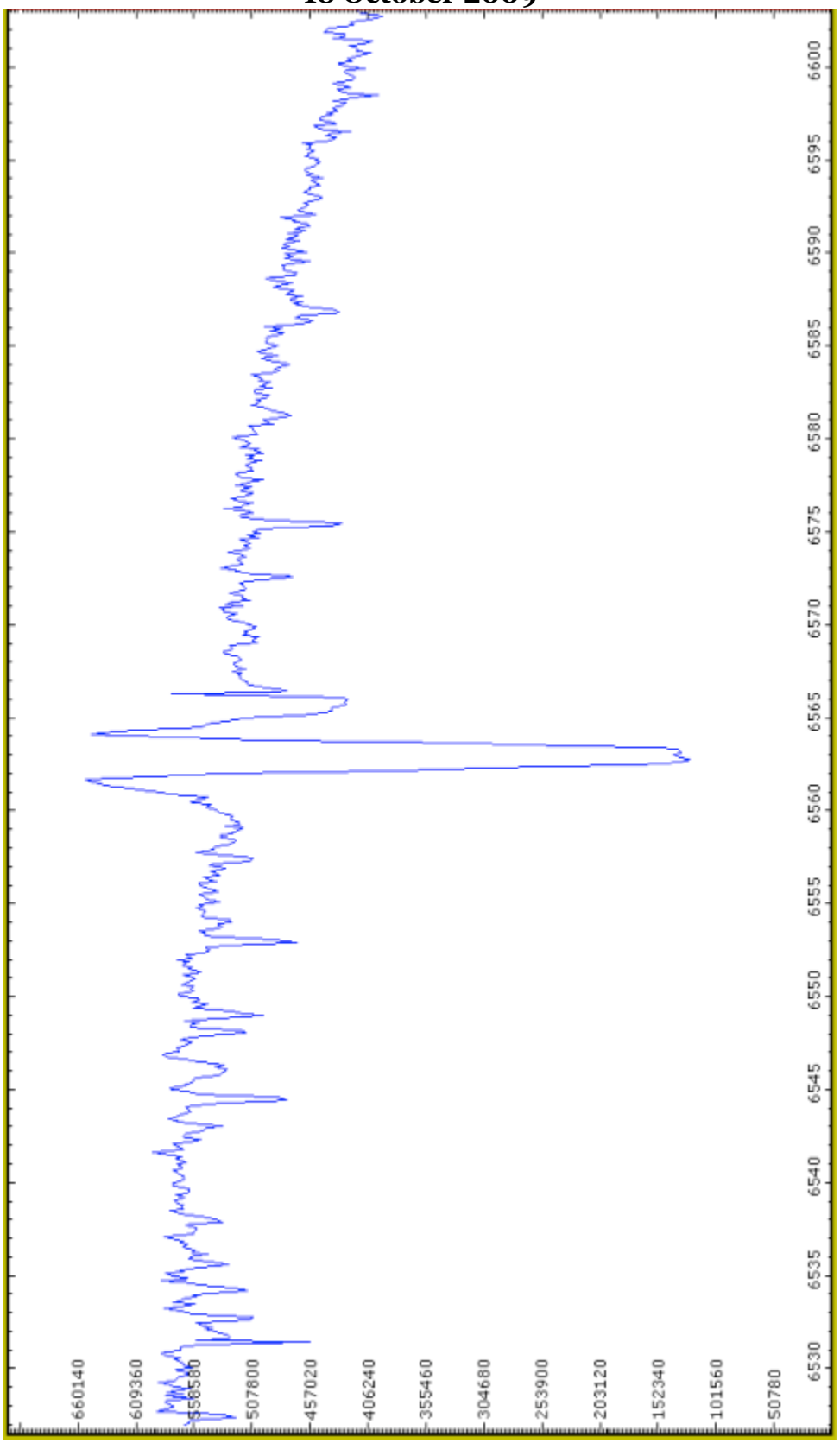
François Teyssier, Yogurt pot observatory, Rouen, France
Equipment: Lhires III Low Resolution, 150 line/mm, CCD Starlight SXV-H9

Epsilon Aurigae
18 November 2009



Jeff Hopkins, Hopkins Phoenix Observatory, Phoenix, Arizona USA
Equipment: Meade 12" LX200 GPS telescope, Lhires III Spectrograph (2,400 l/mm)
DSI Pro CCD camera for guiding, DSI Pro II CCD camera for imaging
Spectra Line Profile corrected with Atmospheric lines and Heliocentric corrected.

18 October 2009



INTERFEROMETRY REPORT
Dr. Robert Stencel, University of Denver Astronomy

Interferometry is a technique by which light from multiple telescopes can be combined to form an image with resolution equivalent to the separation of the telescope, creating a much larger, synthetic aperture. Many are familiar with the Very large Array radio telescope in central New Mexico, which uses this technique to create a multi-kilometer scale (and larger) antenna - http://www.vla.nrao.edu/.

Now, optical and infrared interferometer arrays exist that can similarly achieve synthetic apertures. The largest is the European Very Large Telescope Interferometer -

http://www.eso.org/sci/facilities/paranal/telescopes/vlti/index.html

located in Northern Chile. Three interferometers in North America include the Naval Prototype Optical Interferometer (NPOI) -

http://www.nofs.navy.mil/projects/npoi/

located near Flagstaff, AZ and the Infrared Spatial Interferometer (ISI) -

http://isi.ssl.berkeley.edu/ -

located at Mt.Wilson, CA and the Center for High Angular Resolution Array (CHARA) -

http://www.chara.gsu.edu/CHARA/ -

also atop Mt.Wilson. Previously, Palomar mountain, CA also had the Palomar Testbed Interferometer (PTI) -

http://pti.jpl.nasa.gov/ -

which had observed epsilon Aurigae several times, reporting an angular diameter of 2.28 milli-arcseconds (mas). An arc-second is about the seeing resolution limit of a typical small telescope, while a milli-arcsecond is 1/1000 part of an arc-second. Combining light interferometrically enables one to surpass the usual seeing limit. However, to create an image (and not simply obtain a one dimensional size estimate), light from three or more telescopes needs to be combined in so-called closure phase mode. This closure phase imaging now is being done at VLA, VLTI and CHARA.

We've been fortunate to have obtained observing time at PTI during 2006 and 2007, and at CHARA in 2008 and 2009. Pre-eclipse observations confirm the angular diameter of the F star to be 2.28 mas in the infrared K band (http://arxiv.org/abs/0810.5382). We have been extremely fortunate to obtain ingress data at CHARA during 2009 November, despite the fire damage and road closures around Mt.Wilson. Observations were made with both the MIRC (infrared) and VEGA (optical) detector systems. At this time, we can report that a "Pac Man" like image was obtained, but the details are still subject to data processing and submittal of a report on behalf of the team. Interferometric image reconstruction is something like trying to assemble a jigsaw puzzle with most of the pieces missing.

Full details on results will appear in future newsletters.

POLARIMETRY REPORT

Gary Cole, Starphysics Observatory, **Reno, NV**
Latitude 39.400379 Longitude 119.7957, Altitude 5194ft

From an E-Mail of 12 November 2009

Dear Dr. Stencel,

I wanted follow-up our brief conversation at the SAS meeting concerning polarimetry of epsilon Aurigae. Again let me thank you for the copy of Gary
Henson's dissertation.

It has take more effort than I had originally anticipated, but I now have an automated dual beam imaging polarimeter that appears to be providing linear polarimetry results on bright stars to 0.1%.

The instrument consists of a dedicated C-8 followed by a Optec filter slider, a rotating achromatic halfwave plate, a bandpass limiting filter (400-700), a 13mm calcite Savart plate, and an ST6 CCD camera. It currently has CVR filters, but I am changing this to BVR later this year.

The C8 subsystem is mounted on my automated C14 which provides target acquisition and guiding (along with photometry and spectroscopy).

The polarimeter images are slighted defocused so as to maximize the effective photon count while avoiding saturation.

The exposure time is dynamically adjusted so as to ensure that no frames have pixels outside the linear region of the ST6. This turns out to have the side benefit of allowing exposures with some variable overcast. If any star gets too bright, the entire 4 frame data set is restarted at a lower exposure time.
My observing sequence is to take 5 sets in each filter. Each set consists of a dark and 4 data frames with the usual (0,22.5,45,67.5) waveplate orientations. Each of the eight star images has about 1.5 million photons so the photon statistics should be better than 0.1%.

The reduction arithmetic of course increases the statistical error, so multiple data sets are needed to bash it back down.

The data is dark subtracted, and flat fielded. The guiding and differential flexure bring in some error in pixel positioning even though the dual beam procedure is self flattening. The analysis software also rejects data with excessive pixel variation between frames.

The net of this is that the standard deviation of the 5 observation (1 filter) data set is running about 0.03% for the best data that I have to date.

My software does real time reduction, so I have reduced polarimetry within a minute of completing the observing sequence. Of course the whole sequence takes the better part of an hour.

Observations of several polarization standards are giving results within +-0.1 of the published values. One of these is Chi-Aur which is 2% polarized, making a nice nearby reference.

Observations of zero polarization standards are showing instrumental polarization of less than 0.2% (and most of time less than 0.1%)

Using a polaroid filter I observed that the peak extinction ratio is more than 500:1, so there is no significant QU crosstalk and no significant depolarization.

That's the good news. Unfortunately it has taken 4 months to get all this to work and write the software. Our good observing weather is now going away.

I will, however, get as much epsilon Aurigae data as possible. I intend to offer an SAS paper on the instrument.

If you know of others doing this work, I would be appreciate knowing about them as I am clearly still on the learning curve in this black art.

Best Regards,
Gary Cole
www.starphysics.com
garycole@mac.com

From Dr. Bob

Dr. Robert E. Stencel, Co- Editor
University of Denver Astronomy Program
<rstencel@du.edu>
https://twitter.com/epsilon_Aurigae

Winter 2009/11, 091121

Headlines at: www.twitter.com/epsilon_Aurigae

The amount of observing being conducted and reports being received is staggering, and we thank you for possibly the best eclipse coverage in history. That said, some peculiar things are being seen.

When did eclipse first contact ingress begin? As Jeff reports in this Newsletter, he estimates V band ingress to have occurred on JD 2,455,059.266. Casual inspection of the composite V data plot suggests a span of dates from RJD 55,060 to 55,065 are plausible, and M.M.Santangelo in AT2224 submits a statistical study of his own data that points to ingress beginning on RJD 55,062 or 2009 August 19

(http://www.astronomerstelegram.org/?read=2224).

In our book *Epsilon Aurigae: A Mysterious Star System*, we forecast a start date earlier in August, based on extrapolation from the previous eclipse. Thus it appears that eclipse began one to two weeks late compared with recent eclipses.

Examining the composite and individual light curves in this Newsletter reveal some interesting points. The beginning of V band ingress had a steeper slope until RJD 55,110 and then a shallower slope appears through the present (55,155). Previous ingress lasted 142 days, suggesting we should reach nominal minimum light circa RJD 55,202 (early January 2010). Indeed, we passed the 0.4 magnitude decline in V brightness about on schedule (55,135) but the shallower slope could protract arrival at V = 3.74 into the second half of January 2010. Diligent observing is required to determine the truth. One could fit an out-of-eclipse brightness fluctuation to the current behavior, quasi period circa 140 days, with a local maximum at the present causing the change of slope. In that event, we might see return of steeper descent during December 2009.

Some color differences are emerging too. The V band slope change around RJD 55,110 appears later in B (55,115?) and U (55,120?), and is less obvious in R and I bands. Mid-ingress eclipse depths appear similar in UBV and R but shallower in I band. Paul Beckmann's plot even shows a rebound in B band during the most recent points (to 55,150). Brian McCandless, who gets the prize for most filters in use, shows the slope change apparently is least in the longer wave filters (J & H). These

differences are an important clue to the detailed structure of the eclipsing body, dimension to which is provided by spectroscopy, polarimetry and interferometry. However, the story continues to unfold, so photometric analysis is still preliminary. We encourage all observers to prepare their results for presentation and publication at the next Society of Astronomical Sciences (www.socastrosci.org) meeting in 2010 May and/or the Citizen Sky meeting in 2010 September (www.citizensky.org)

Spectra of epsilon Aurigae in both optical and near infrared wavelengths is being obtained. We are grateful to all observers for their efforts. Robin Leadbeater has made heroic strides in mapping the neutral potassium (K I) line that has revealed disk substructure even before ingress. An optically thin (weak) line like K I is very sensitive to increases in column density. Robin found increases in K I strength (rings?) as early as last spring (circa RJD 54,975), during summer (circa 55,025) and with ingress (circa 55,060), plus plateaus (ring gaps?) during June (circa 54,900) and early August (55,040). K I does not appear to see the change in V band slope after 55,110 however. As Thompson and collaborators reported during last eclipse

(http://adsabs.harvard.edu/abs/1987ApJ...321..450T)

lines like K I and Na D showed slow but steady increase throughout the entire eclipse, whereas H alpha was strongest in absorption around mid-eclipse. The low excitation energies of the K and Na lines make them good tracers for cool material in the eclipsing body (disk). The 0.5A redshift of the core in Robin's spectrum implies a 20 km/sec motion away from the observer, consistent with rotation of the disk.

It is pleasing to see the report by Garrel and collaborators who have access to a fine 2.2 meter telescope. Their series of H-alpha spectra, like those of Christian Buil and Lothar Schanne, show recent development of core structure: either a redshifted extra absorption or an inverse P Cygni emission core. Both are indicative of motion away from the observer, consistent with the K I. Buil nicely demonstrates the changes in weak absorption lines, like those near 6495A, due to the eclipsing body. The weak spectral features arise from neutral elements of Ca, Fe, Ti and show increases analogous to those studied by Steno Ferluga during last eclipse (see http://adsabs.harvard.edu/abs/1991A%26A...243..230F). In addition to these reported spectra, additional observations are being made by Nancy Morrison at University of Toledo Ritter Observatory, and William Ketzeback and colleagues at Apache Point Observatory.

See initial raw data report at

http://users.apo.nmsu.edu/~bketzeba/eAurigae/BOG09.html

Elizabeth Griffin (DAO) reports obtaining funding to digitize older Mt.Wilson high dispersion spectra of epsilon Aur. We have also been obtaining new JHK region spectra at the 4 meter IRTF, but not with the regularity needed. Finally, if any spectrum observers have sufficient resolution, it would be useful to check on the presence of s-process element lines of Y, Zr and Eu in the spectrum of epsilon Aurigae. Ideal lines occur at 6435.0A (Y), 6143.3 and 4805.9A (Zr) and 6645.1A (Eu).

See Wylie et al. 2006

(http://adsabs.harvard.edu/abs/2006ApJ...649..248W)

for example spectrum fittings. The s-process elements are an important clue to the evolutionary state of the system.

On the polarimetry front, Gary Cole (SAS) reports his pursuit of polarimetry in this Newsletter –

bully! He and another Gary – Henson (ETSU) are the twin pioneers in this important arena for this eclipse. During last eclipse, Gary Henson's thesis advisor, Jack Kemp, made the key polarimetric measurements that seem to match preliminary findings of the interferometry. Hence, new series may prove equally crucial to interpretation of the eclipsing body. In the arena of spectropolarimetry, Nadine Manset (CFHT) is our expert and we eagerly anticipate results forthcoming.

Interesting Papers

Some interesting epsilon Aurigae papers to appear at the January 2010 AAS meeting include:

Epsilon Aurigae - Two-year Totality Transpiring

Brian K. Kloppenborg[1], R. E. Stencel[1], J. L. Hopkins[2]

1-University of Denver, 2-Hopkins Phoenix Observatory

Abstract: The 27 year period eclipsing binary, epsilon Aurigae, exhibits the hallmarks of a classical Algol system, except that the companion to the F supergiant primary star is surprisingly under-luminous for its mass. Eclipse ingress appears to have begun shortly after the predicted time in August 2009, near JD 2,455,065. At the University of Denver, we have focused on near-infrared interferometry, spectroscopy, and photometry with the superior instrumentation available today, compared to that of the 1983 eclipse. Previously obtained interferometry indicates that the source is asymmetric (Stencel, et. al. 2009 APLJ) and initial CHARA+MIRC closure-phase imaging shows hints of resolved structures. In parallel, we have pursued SPEX near-IR spectra at NASA IRTF in order to confirm whether CO molecules only seen during the second half of the 1983 eclipse will reappear on schedule. Additionally, we have obtained J and H band photometry using an Optec SSP-4 photometer with a newly written control and analysis suite. Our goal is to refine daytime photometric methods in order to provide coverage of the anticipated mid-eclipse brightening during summer 2010, from our high-altitude observatory atop Mt. Evans, Colorado. Also, many parallel observations are ongoing as part of the epsilon Aurigae international campaign

(http://www.hposoft.com/Campaign09.html)

In this report, we describe the progress of the eclipse and ongoing observations. We invite interested parties to get involved with the campaign for coverage of the 2009-2011 eclipse via the campaign web sites:

http://www.hposoft.com/Campaign09.htm
and
http://www.du.edu/~rstencel/epsaur.htm
and
http://www.citizensky.org

This research is supported in part by the bequest of William Herschel Womble to the University of Denver. We are grateful to the participants in the observing campaign and invite interested parties to join us in monitoring the star for the balance of the eclipse.

Diverse Team Working on Epsilon Aurigae Enigma

Sally Seebode[1], D. Stanford[2], D. Drumheller[2], S. Howell[3], D. Hoard[4], R. Stencel[5]

1-San Mateo High School, 2-College of San Mateo, 3-NOAO, 4-SSC, 5-Denver University

Abstract: After 175 years of study, astronomers still debate the identity of the companion that eclipses epsilon Aurigae every 27 years. By obtaining and analyzing observations from the College of San Mateo (CSM) 8" telescope, the Spitzer Space Telescope, and the Kitt Peak National Observatory, our team hopes to shed light on this mystery. Using spectra from CSM and Kitt Peak, students make equivalent width, relative velocity, and full width half max measurements of prominent absorption lines. Comparisons of these measurements combined with photometric data from Spitzer should illuminate more details of the Epsilon Aurigae dark companion. Data collection started in February 2009 (pre-eclipse) and will continue throughout the two-year event. This study is part of the NASA/IPAC Teacher Archive Research Project (NITARP).

Citizen Sky, Solving the Mystery of epsilon Aurigae

Rebecca Turner[1], A. Price[1], B. Kloppenborg[2], R.Stencel[2], A. Henden[1]

1-AAVSO, 2-University of Denver

Abstract: Citizen Sky is a multi-year, NSF funded citizen science project involving the bright star epsilon Aurigae. The project was conceived by the IYA 2009 working group on Research Experiences for Students, Teachers, and Citizen-Scientists. Citizen Sky goes beyond simple observing to include a major data analysis component. The goal is to introduce the participant to the full scientific process from background research to paper writing for a peer-reviewed journal. It begins with a 10 Star Training Program of several types of binary and transient variable stars that are easy to observe from suburban locations with the naked eye. Participants then move on to monitoring the rare and mysterious 2009-2011 eclipse (already underway) of epsilon Aurigae. This object undergoes eclipses only every 27.1 years and each eclipse lasts nearly two years. The star is bright enough to be seen with the naked eye from most urban areas. Training will be provided in observing techniques as well as basic data analysis of photometric and visual data sets (light curve and period analysis). The project also involves two public workshops, one on observing (already held in August of 2009) and one on data analysis and scientific paper writing (to be held in September 2010.)
This project has been made possible by the National Science Foundation.

BOOK
Epsilon Aurigae A Mysterious Star System

by

Hopkins and Stencel

This is a 287 page soft cover book covering the history of epsilon Aurigae and the observations both in and out-of-eclipse as well as the different techniques used.

Note: We only have a handful of copies left. While we plan to provide a second addition after the eclipse, there will be no second printing of the first edition. This is a last chance to get a first edition copy of the book.

For more information
http://www.hposoft.com/EAur09/Book.html
$29.95 + S&H

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

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

Clear Skies!
Jeff
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