

British Astronomical Association



VARIABLE STAR SECTION CIRCULAR

No 172, June 2017

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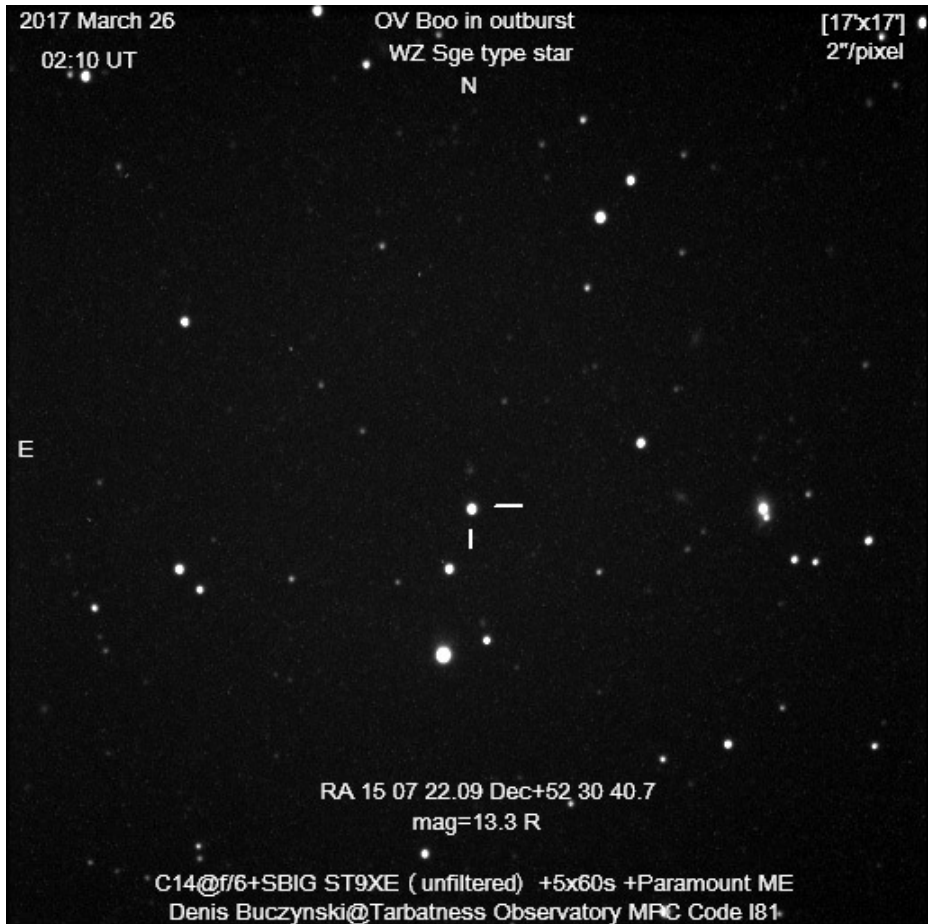
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TWO IMAGES OF OV BOO IN A RARE OUTBURST.

DENIS BUCZYNSKI

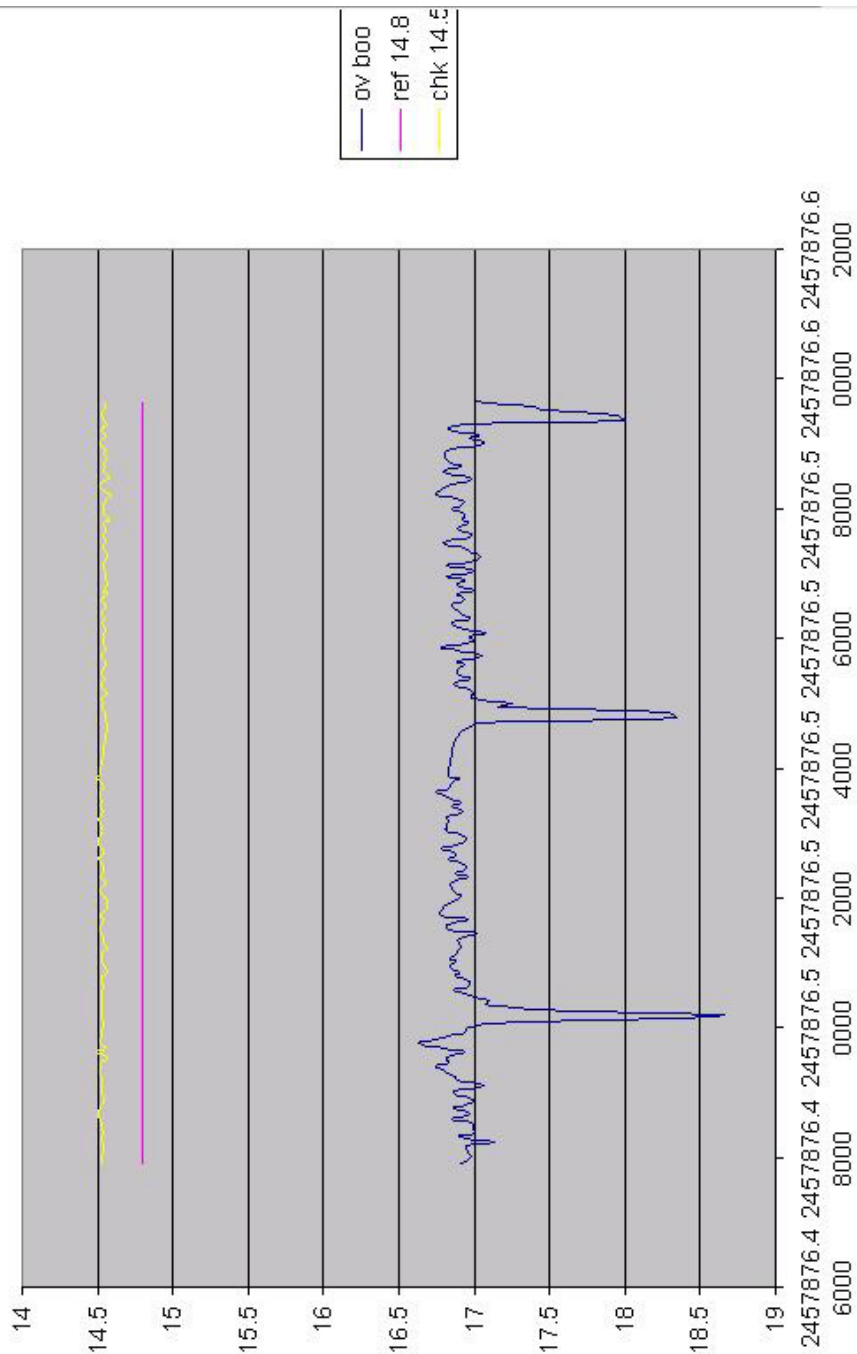


Two images of OV Boo in a rare outburst are shown on pages 2, and 3. The first is of the star field showing the star in outburst, photograph taken by *Denis Buczynski*. The second, on page 3, is a light curve by *Denis Buczynski* showing the eclipses.

Here is a link to some further details about this star:

(cba:news) Fwd: [vsnet-alert 20780] Re: OV Boo outburst = SDSS J1507+52

OV BOO 20170502_03 DGB_Tarbatness



FROM THE DIRECTOR

ROGER PICKARD

VSS Circulars

This is the last Circular appearing as a hardcopy, as from the next one (Number 173 for September 2017) it will be available as a PDF only. Having said that, the BAA Office have kindly agreed to print out a very few copies that we can send to those members who do not have Internet access for whatever reason. Fortunately, the number of members in this category is exceedingly small!

I must now thank Janet Simpson, our Circulars Editor, for all her hard work over the last 10 years in preparing the Circulars. Interestingly, this is approximately the same time that our preceding Editor, Karen Holland, also served the Section for. Janet has been keen to step down for a little while now and so I am very grateful to her for continuing for as long as she has.

I must now thank Gary Poyner for agreeing to take over the production of the Circulars for the September edition onwards. To this end, Gary writes:-

The new PDF version of the VSSC will continue to be released in September, December, March and June - hopefully on the first day of each of these months. It will also be available for download from both the BAA and VSS web pages on the 1st. Deadlines for submission to the Circular will be the 15th of the month preceding release (Aug 15th for the September circular). Articles should be sent either as text or MS Word files. If you use other software to create your files, please send as plain or formatted text. Images can be any format you like. The size of the circular will of course depend on contributions, but I hope to keep it to a reasonable size for e-mailing and downloading. Some material may be held back for the following Circular should contributions be high. If you send material for the Circular and would like to include a small photo of yourself, please do so. It's always nice for readers to see who is writing about variable stars.

roger.pickard@sky.com

NAMING CONVENTIONS - A REMINDER.

GARY POYNER AND ANDY WILSON

There has been some confusion in the past on how to report NSV and NSVS objects to the VSS database. Before the star names were edited by Andy Wilson in April 2017, a quick look at the star list in the database revealed several different formats... NSV xxxx, NSVxxxx, NSVxxxx(Con), NSV xxxx(Con) and NSV xxxx (Con)

The database will see the (incorrect) name as a new object and create a new entry for it. One might not think that this is a big problem, but where two or more entries exist for the same star, it is impossible to draw a complete light curve or compile a complete data table for the object. I see several different formats reported to me each month for the TA VS pages, but it's very easy for me to edit them out. For the VSS database though, these have to be done by a section officer on a regular basis to keep the database as up-to-date as possible.

So what is the proper format? I don't ever remember being told as to the correct way to write the name. Instead we have to assume that professional databases get it right. Both SIMBAD and VSX use the following format...

NSV xxxx A gap between the 'V' and the first number, where there are no leading zero's, and without the constellation being included i.e. NSV 2026.

Though the format of NSV star names is a common mistake, there are many others. Please see the following list of some of the more common name formats:

SS Cyg - Space between letter designation and constellation.

Delta Cep - Full english spelling of greek letter followed by 3 character constellation

Gaia16ams - No spaces

HD 126138 - Space between HD and number

Nova Aql 2012 - Spaces between Nova, constellation and year

NSV xxxx - Space between NSV and the identification number

NSVS xxxx - Space between NSVS and the identification number

SN 2016ino - Space between SN and year but no space between year and letter identifiers

V1404 Cyg - Space between Vxxxx and constellation

Would those observers who use one of the incorrect formats to report to the VSS DB (and me at TA), please change to the correct format as soon as possible.

garypoyner@blueyonder.co.uk

THE MOST UN-LOVED VARIABLE STARS

TRACIE HEYWOOD

Some stars on the section's programmes are very popular with observers. Others, however, seem to receive little attention.

Looking at the Binocular Programme, the following stars have (as of May 2017) less than 20 observations in the database for 2016:

V Ari	SRb	9	
KK Per	Lc	9	
RX Vir	SRd?	11	(none in 2015)
R Aqr	Mira	0	(13 obs in 2015, but only 4 during 2010-2014)
V386 Cep	SR/Mira	16	(but none for 2011-2015)
SU Cnc	Mira	13	

RT CVn	Mira	0	(1 obs in 2017, only 14 during 2012-2015)
T Dra	Mira	15	
V443 Her	ZAND	4	
R Hya	Mira	11	
RS Leo	Mira	16	
W LMi	SRd	2	(and only 10 during 2013-2015)
X Lyn	Mira	12	
V651 Mon	I+E	17	
V686 Mon	Mira	0	(last observed in 2013)
RS Per	SRc	18	(but only 4 in 2015)
BU Per	SRc	19	(but only 3 in 2015)
V513 Per	Mira	0	(none for 2011-2015 ... but has been observed in 2017)
FR Sct	ZAND	0	(last observed in 2004)

CVs are excluded from the above list as they could simply have been at minimum throughout the year. ICCE stars are also excluded.

The early 2017 observations of V513 Per were by Don Matthews. The early 2017 observation of RT CVn was by C D Beech.

Many more stars on the Telescopic Programme were similarly “neglected” in 2016.

Some especially so:

UW Aql	Lc	4	(none in 2015)
R Aqr	Mira	0	(13 obs in 2015, but only 4 during 2010-2014)
V386 Cep	SR/Mira	16	(but none for 2011-2015)
SU Cnc	Mira	13	
RT CVn	Mira	0	(1 obs in 2017, only 14 during 2012-2015)
T Dra	Mira	15	
V443 Her	ZAND	4	
R Hya	Mira	11	
RS Leo	Mira	16	
W LMi	SRd	2	(and only 10 during 2013-2015)
X Lyn	Mira	12	
V651 Mon	I+E	17	
V686 Mon	Mira	0	(last observed in 2013)
RS Per	SRc	18	(but only 4 in 2015)
BU Per	SRc	19	(but only 3 in 2015)
V513 Per	Mira	0	(none for 2011-2015 ... but has been observed in 2017)
FR Sct	ZAND	0	(last observed in 2004)

It might seem that FR Sct is the most unloved star, having last been observed on October 13th 2004 - by Gary Poyner. It does, however, have a total of 57 observations in the database, where as V686 Mon only has a mere 36, with 29 of these being from as long ago as 1987. The most recent observation of V686 Mon, on March 1st 2013, was by C Knight.

Its' (somewhat sparse) light curve, shown on page 7, does suggest that it varies over a sizeable range and is worthy of further study ... so why not give it a go?

Why are some stars being “neglected”?

Southerly declinations probably work against some stars, such as R Aqr, R Hya and FR Sct.

Some of the Mira variables may be too faint for observers' instruments when near minimum.

Some might simply prove difficult to observe, e.g. if they are very close to other stars.

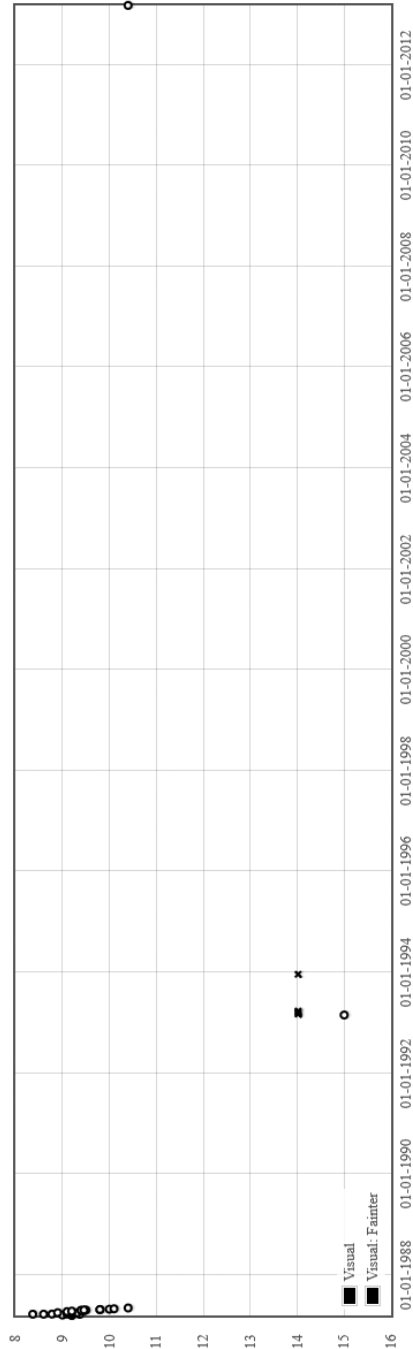
Another factor will be access to charts, with observers being less likely to observe stars (such as RT CVn, V686 Mon, V513 Per and FR Sct) whose charts are not yet downloadable.

Similarly, it has probably been the case historically that the Binocular Programme has been seen as the “reds” programme and the Telescopic Programme has been seen as the “CVs” programme. Quite possibly some “reds” observers with larger instruments were unaware of the SRs and Miras on the Telescopic programme.

But, if you are looking for new stars to observe, the stars on the above lists would welcome your attention.

tracieheywood832@gmail.com

Light Curve for V686 MON



Symbol Key: Crosses = Negative observation, Triangle = Brighter than, Otherwise: Circle = Visual, Diamond = CCD, Square = Everything else

Contributors: C Knight, S J Lubbock, M J Nicholls, G Poyner, G Ramsey, M D Taylor, W J Worraker

347-01

6° FIELD DIRECT

VV CEPHEI

21h 56m 39.1s +63° 37' 32" (2000)

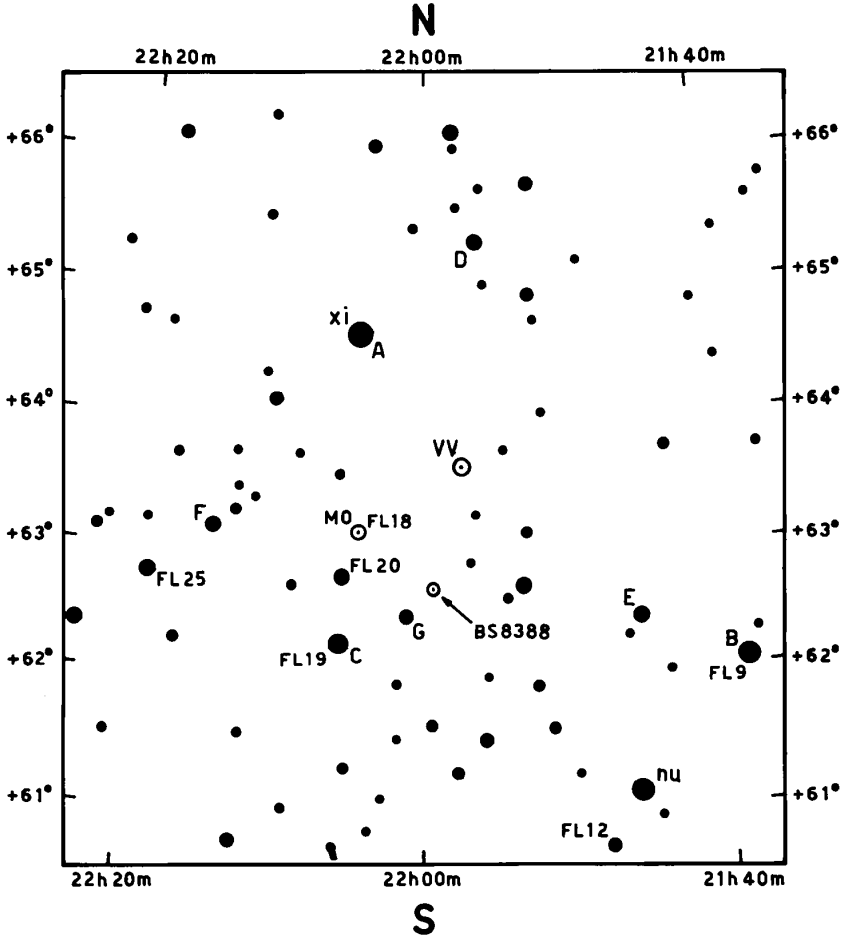


CHART:
 ATLAS BOREALIS
 SEQUENCE:
 HIPPARCOS VJ

A 4-3 E 5-9
 B 4-8 F 6-1
 C 5-1 G 6-7
 D 5-8

BAA VSS
 EPOCH: 2000
 DRAWN: JT 18-4-17
 APPROVED: RDP

VV CEPHEI

JOHN TOONE

VV Cep is a red supergiant star that varies in an irregular/semi-regular manner over a small range (roughly 4.9 to 5.4 in V but a little fainter visually due to its red colour) but also at 20 year intervals eclipses a fainter blue companion. The blue star is at magnitude 7.0V and is normally 1.7 magnitude fainter than the red star in V so the eclipse depth is only 0.2 magnitude in V. In B however the eclipse depth is much greater in the order of 0.8 magnitude due to the components being roughly equal in brightness. VV Cep is the brightest eclipsing binary to contain a red supergiant star and also has one of the longest known orbital periods. The mid-point of the next eclipse is in June 2018 with the eclipse due to commence in August 2017.

Spectra taken by Cannon in 1907 & 1908 indicated HD208816 to be a Mira star candidate but examination of photographic plates revealed only a limited variation range of 0.5 magnitude. Visual observations by Wendell in 1908 found an even smaller range in the order of 0.25 magnitude. Although clearly not a Mira, HD208816 received the official variable star designation of VV Cep in 1925. Following more striking variation noted by McLaughlin in 1936 Sergei Gaposchkin reviewed historical photometric, spectroscopic & radial velocity data which revealed the long term eclipsing nature of VV Cep. Eclipses had been recorded in 1896, 1916 & 1936 and Gaposchkin calculated the interval to be 7430 days with an eclipse duration of 490 days (450 days for totality). The photographic data showed a consistent eclipse depth of 0.8 magnitude but in visual light the corresponding drop was only 0.1 magnitude. Gaposchkin interpreted that the binary system consisted of two stars: 1) red component: 5.7vis, 7.4pg; and 2) blue component: 7.4vis, 7.3pg; and the eclipse occurred when the blue component was obscured by the red component. Both stars were super-massive giants and Gaposchkin's basic assessment of the system stands true today.

There were eclipses observed in 1956-57, 1977-78 and 1997-98 and the physical parameters of the system have been refined to the following:

Both components are roughly 20 solar masses but that is where their similarities end. The cool red supergiant is spectral class M2Iab, between 1000-1800 solar radii in size and with a temperature of 3800K. The hot blue star is spectral class B0-B2V and is much smaller at 13-25 solar radii with a temperature of 25000K. The binary components are on average 25AU apart which is too great for significant mass transfer but there is wind interaction causing an accretion disk around the blue star. The system is 4900 light years distant.

The next eclipse is predicted to be:

4 August 2017: Eclipse commences

27 October 2017: Totality commences

1 June 2018: Mid eclipse

6 February 2019: Totality ends

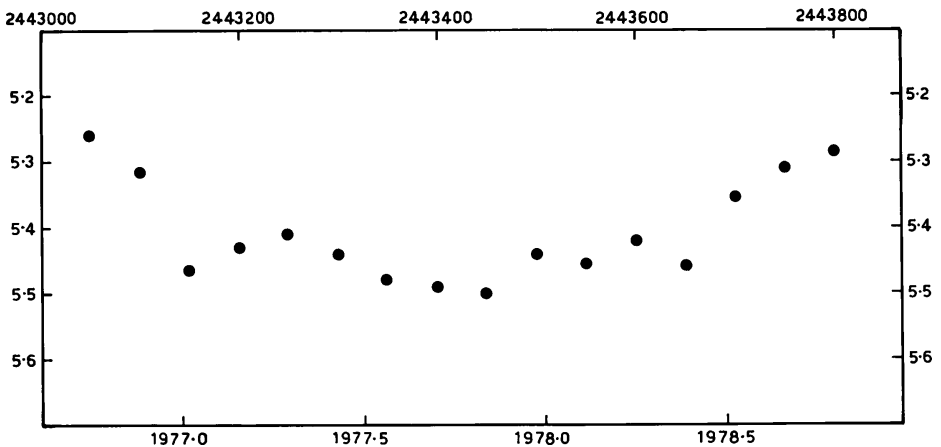
16 May 2019: Eclipse ends

The accompanying light curve (50 day means) compiled from NVAVSO visual observations illustrate the shallow (0.2 magnitude) fade recorded during the 1977-78 eclipse which appeared to last 650 days. The accompanying chart includes a sequence for visual observers to use to monitor the variation of the red supergiant in addition to the smaller variation caused by the eclipse of the blue star.

Due to its small range of variation VV Cep is more suited to DSLR and CCD camera work especially in U and B. Recommended comparison stars are (both identified on the chart):

20 Cep: U=8.46, B=6.68, V=5.27

19 Cep: U=4.33, B=5.17, V=5.11 (also labelled as comparison C)



Measurements prior to and after the eclipse that show the variations outside of the eclipse will help to interpret any variation recorded during the eclipse.

Spectroscopic measurements outside of and during the eclipse are also encouraged and will help in particular in interpreting the physics of the accretion disk around the blue star. Useful guidance on undertaking spectroscopy of VV Cep is given in the web-page referenced on page 12.

VV Cep lies in a rich Milky Way field occupying a central position within the diamond of Cepheus and at nearly 64 degrees north it is circumpolar from the British Isles.

An international campaign has been launched to study the 2017-2019 eclipse of VV Cep and details can be found here:

<http://www.ap.smu.ca/~pbennett/vvcep/campaign2017.html>

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ECLIPSING BINARY NEWS - MAY 2017

DES LOUGHNEY

Zeta Aurigae - 2017 Eclipse

Zeta Aurigae is a well known eclipsing binary which has a period of 972 days. The eclipse lasts about 37 days and is somewhat unusual because a small very hot blue star passes behind a supergiant red star. Ingress and egress last about 1.5 days. There are no sharp boundaries to the eclipse as the smaller star continues to shine, during ingress and egress, through the tenuous outer atmosphere of the larger star.

The midpoint of the 2017 eclipse was scheduled for 16th March which means that ingress was around 27th February and egress around 3rd April.

Observations of this year's eclipse showed that the predictions were probably correct. The weather only allowed limited observations. Ingress could not be observed at all. The V magnitude during the eclipsed averaged 4.07. Egress was caught on 2/4/17 when the magnitude was 3.99. Later in April the out of eclipse magnitude was 3.85.

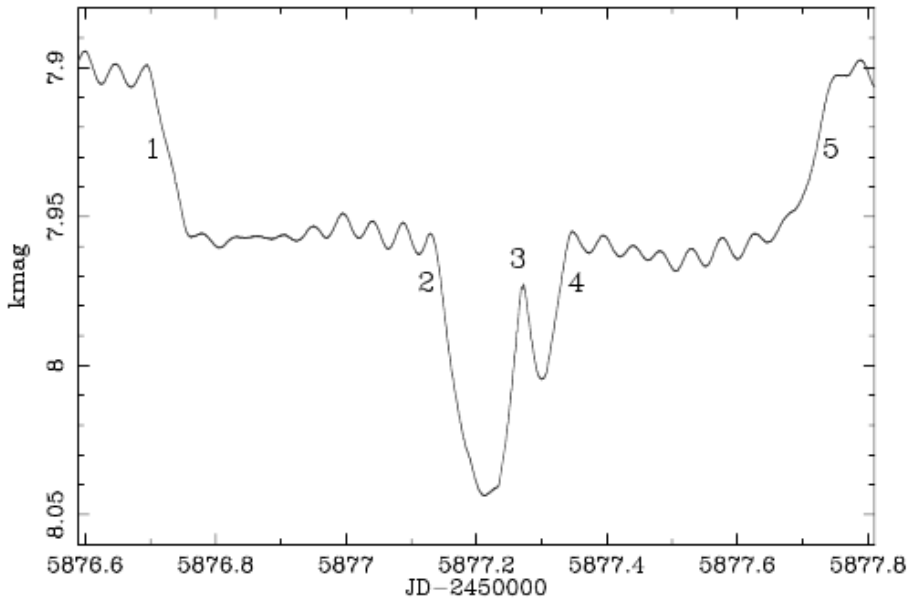
There are differing views of the depth of the eclipse. GCVS states it to be 0.27V and Krakow 0.6V. In the 2009 eclipse the depth was found to be 0.15V. In 2017 the depth was found to be 0.22V.

A multi-eclipsing quintuple system

A paper has recently been written (March 2017)

[<https://phys.org/news/2017-03-astronomers-rare-multi-eclipsing-quintet-stars.html>](https://phys.org/news/2017-03-astronomers-rare-multi-eclipsing-quintet-stars.html)

on a quintuple system that exhibits four periods of eclipses: 94.2d, 8.65d, 1.52d and 1.43d. The primary star is fairly bright with a Kepler magnitude of 7.899. The paper has used publicly available photometric data from the Kepler Telescope. The star is HIP94924. Kepler data can pick out eclipses/pulsations with very small amplitudes. On page 12 is a complex light curve taken from the paper. It exhibits one eclipse between 1 and 5 (when a star transits the primary). There is another eclipse between 2 and 4 (when another star transits the primary). 3 represents the eclipse of the two eclipsing stars of the primary.



The wave like modulations comes from the pulsations of the primary.

Merging Contact Eclipsing Binary - a Luminous Red Nova in 2022?

Astronomers <https://en.wikipedia.org/wiki/KIC_9832227> are studying a contact eclipsing binary with the code name KIC 9832227 in the constellation Cygnus. The system has an apparent magnitude of around 12 with eclipses having a depth of 0.19 magnitude. The period is 11 hours. The period has been growing shorter. It is predicted that the cores of the two stars will merge between September 2021 and September 2022. The merger will produce a luminous red nova so that the merged star may reach magnitude 2 for a few weeks and thus be a naked eye object.

The prediction is based on an analysis of Kepler data which shows an exponentially decreasing period.

Observations are called for to confirm the decreasing period and to track the evolution into a luminous red nova. A recent paper can be found at <<http://adsabs.harvard.edu/abs/2017AAS...22941704M>>. Our CCD observers may be able to look at this system though it is also a possible DSLR photometry target.

< desloughney@blueyonder.co.uk >

IBVS 6189 – 6207

JANET SIMPSON

- 6189** V620 Oph = CoRoT 104190253 - a misclassified RR Lyrae star.
(Benko, J. M., 2016)
- 6190** New R Coronae Borealis and DY Persei Candidates in the SMC
(Nikzat & Catelan, 2016)
- 6191** New times of minima of some eclipsing binary stars.
(Bulut, Kabas, et al, 2017)
- 6192** V2477 Cyg - A W-Type Contact Eclipsing Binary. (Nelson, Robert H., 2017)
- 6193** Minima of Eccentric Eclipsing Systems Observed from Mt. Suhora.
(Ogloza, Drozd, et al, 2017)
- 6194** Search for variability of five central stars of planetary nebulae.
(Paunzen, Netopil, Rode-Paunzen, 2017)
- 6195** CCD Minima for Selected Eclipsing Binaries in 2016. (Nelson, R. H., 2017)
- 6196** BAV-Results of observations - Photoelectric Minima of Selected Eclipsing Binaries and Maxima of Pulsating Stars. (HUBSCHER, J., 2017)
- 6197** Additional observations of the 1943 eclipse of TYC 2505-672-1.
(Osborn, & Mills, 2017)
- 6198** A Time Series of BV photometry and H α Emission Fluxes of the Eclipsing Binary VV Cep. (Pollmann, Vollmann, & Bennett, 2017)
- 6201** BN Pegasi (Nelson, Robert H., 2017)
- 6202** New CCD Times of Minima of 17 Eccentric Eclipsing Binary Systems.
(Kim, Chun-Hwey, et al, 2017)
- 6203** V2197 Cyg - A Semi-Detached Eclipsing Binary?
(Nelson, Robert H.; & Robb, Russell M., 2017)
- 6204** Collection of Minima of Eclipsing Binaries, part III. (Zasche, P.; 2017)
- 6205** GSC 02505-00411: A new δ Sct star in the field of RZ LMi.
(Ishioka, R. & Kokumbaeva, R., 2017)
- 6206** Minima Times of Three Selected Systems in Cancer.
(GOKAY, G.; DERMAN, E.; & GUROL, B., 2017)
- 6207** DD CMa: A New Galactic DPV of Extreme Short Period.
(ROSALES G, J.; & MENNICKENT, R. E., 2017)

The Information Bulletin on Variable Stars (IBVS) can be accessed through the WWW in HTML format at the following URL.... <http://www.konkoly.hu/IBVS/IBVS.html>

BINOCULAR PROGRAMME

SHAUN ALBRIGHTON

The various priority levels of the Binocular Programme can now be found on the VSS web site at: http://www.britastro.org/vss/bin_prog_priority_191013.htm or for a full listing in constellation order at: http://www.britastro.org/vss/chartcat_binoc.htm

These listings can be viewed in Circulars 157 - 160, and can be obtained in paper format from Shaun Albrighton and Roger Pickard (Contact details under Director and Binocular Secretary on back page of the Circular).

ECLIPSING BINARY PREDICTIONS – WHERE TO FIND THEM

DES LOUGHNEY - desloughney@blueyonder.co.uk

The publication of Eclipsing Binary Predictions is now discontinued in the VSS Circular. Predictions for RZ Cas, Beta Per and Lambda Tau can still be found in the BAA Handbook. Predictions, completed on a monthly basis, are available on the BAA VSS website at: <http://www.britastro.org/vss/dpredict.html>

If readers require paper copies of the predictions please contact me.

The best source for predictions for Eclipsing Binaries is the Mt. Suhora Astronomical Observatory, Cracow Pedagogical University website (known as the Krakow website)at: <http://www.as.up.krakow.pl/o-c/index.php3>

Click on 'Constellation List', choose your constellation and then choose your system.

A webpage will then appear with lots of useful information regarding the system. In the section entitled 'Light Elements' there is a link entitled 'current minima and phase'. When you click on this link, in the example of Beta Lyrae, you get predictions of primary and secondary eclipses for a period of three months. For systems with very short periods such as RZ Cas the predictions are for one week. For a system such as SW Cyg, with a period of around 4.57 days, the predictions are for a month.

The Krakow website does not tell you how much of an eclipse will be observable at a particular time of the year at your latitude and longitude. However, it has some useful literature references for each system, although they may not necessarily be up to date. Nor are references to the 'Information Bulletin on Variable Stars' included, but these can be found at: <http://www.konkoly.hu/IBVS/IBVS.html>

Although the Krakow website lists the depth of eclipses it does not list the actual V magnitudes at maximum and minimum. For an indication of these magnitudes you will need to visit the 'General Catalogue of Variable Stars' website at: <http://www.sai.msu.su/groups/cluster/gcvs/gcvs/>

Click on 'GCVS Query Form', type in a designation such as SW Cyg, and click on 'Search'. The resulting information displayed shows that maximum is 9.24V, primary minimum 11.83V, and secondary minimum 9.30V. These magnitudes, however, may have been determined some time ago.

The GCVS website gives SW Cyg a period of 4.57313411 days but the Krakow website lists the period of SW Cyg as 4.572986 days. The latter is more likely to list the most up to date period. It must always be borne in mind that small changes in a period can result in significant changes in the times of minima if the period was determined a few years ago.

CONTRIBUTING TO THE CIRCULAR

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(see above)

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TELEPHONE ALERT NUMBERS

Nova and Supernova discoveries

First telephone the Nova/Supernova Secretary, Guy Hurst: 01256 471074
If only answering machine response, leave a message and then try the following:
Denis Buczynski 01862 871187,
Glyn Marsh 01624 880933, or
Martin Mobberley 01284 828431.

Variable Star Alerts

Telephone Gary Poyner: 07876 077855