British Astronomical Association

VARIABLE STAR SECTION CIRCULAR

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Contents

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JOINT MEETING OF THE AAVSO AND THE BAA VSS

FRIDAY, 11TH APRIL 2008

CAMBRIDGE UNIVERSITY, NEW HALL COLLEGE

Photograph: courtesy of Mrs Hazel McGee

FROM THE DIRECTOR.

Roger Pickard

Joint Meeting with the AAVSO

Well, the Meeting with the AAVSO has come and gone. By all accounts it was very successful. It certainly seemed so to me but then I was in the thick of it!

But I must mention two things. Well certainly one, and modesty almost forbids me to mention the second!

Firstly, as you know, Gary Poyner passed the amazing total of 200,000 visual observations last year (see *VSSC 132 for June 2007*). It therefore seemed fitting that we should mark this achievement with an award.

So it was with great pleasure that I was able to present Gary with the Charles Butterworth award during the Awards Ceremony at this meeting. The Award took the form of a slate plaque engraved with the light curve of DY Persei, one of Gary's favourite stars. Around the edge the following citation was also engraved:

"This, the second Charles Butterworth award, was presented to Gary Poyner on 12th April 2008 by the Variable Star Section of the British Astronomical Association in recognition of him becoming the first European to accrue 200,000 visual observations of variable stars."

It should be noted that Gary is now the leading European observer of all time and now stands third in the world after Albert Jones (500,000 and still observing) and Danie Overbeek (285,000).

Secondly, I was totally amazed to be presented with honorary lifetime membership of the AAVSO. I'm still not really sure why but am deeply honoured.

Anyway, for those of you who had to miss this meeting for one reason or another you can get a feel for the talks from reading the report later in this Circular. Many thanks to Melvyn Taylor and the speakers for providing notes and summaries of the talks.

International Year of Astronomy

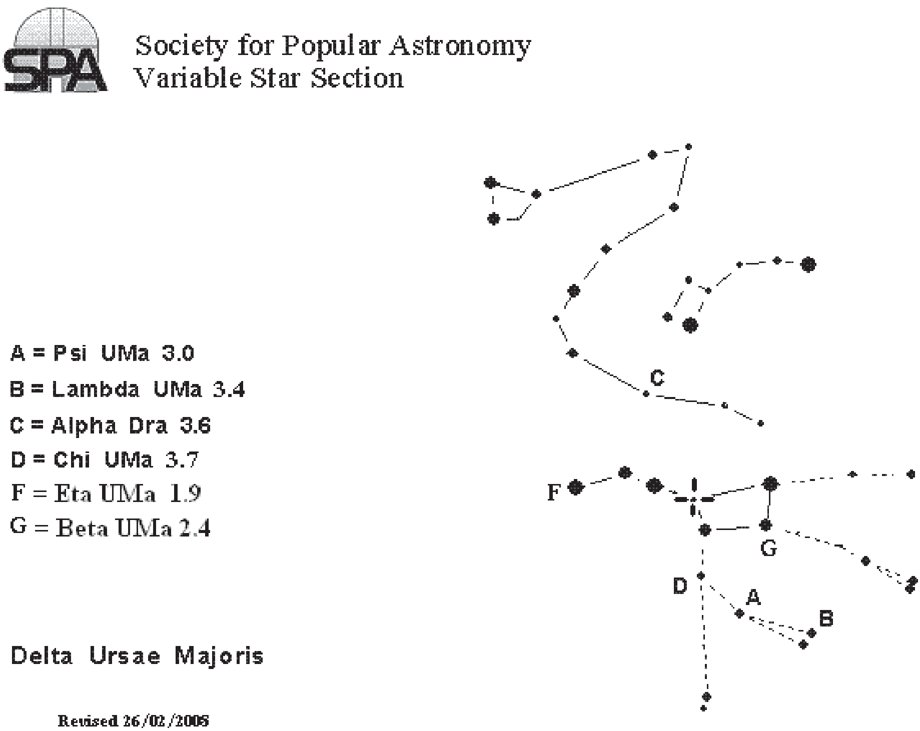
2009 has been declared the International Year of Astronomy. Since the resolution was submited by Italy it seems appropriate for it to celebrate the first astronomical use of the telescope by Galileo, "the initiation of four centuries of search and discoveries, and a scientific revolution" (*http://www.astronomy2009.org/*). So I would like the VSS to mark it in some way, such as with a special meeting. Perhaps not quite as special as this year's, but nonetheless, something different. Any suggestions will be gratefully received.

Joint Observing Project with the Society for Popular Astronomy.

The Society for Popular Astronomy (SPA) and the BAA VSS have agreed to launch a joint observing programme, namely to observe Delta Ursae Majoris and Beta Leonis as suspected variables.

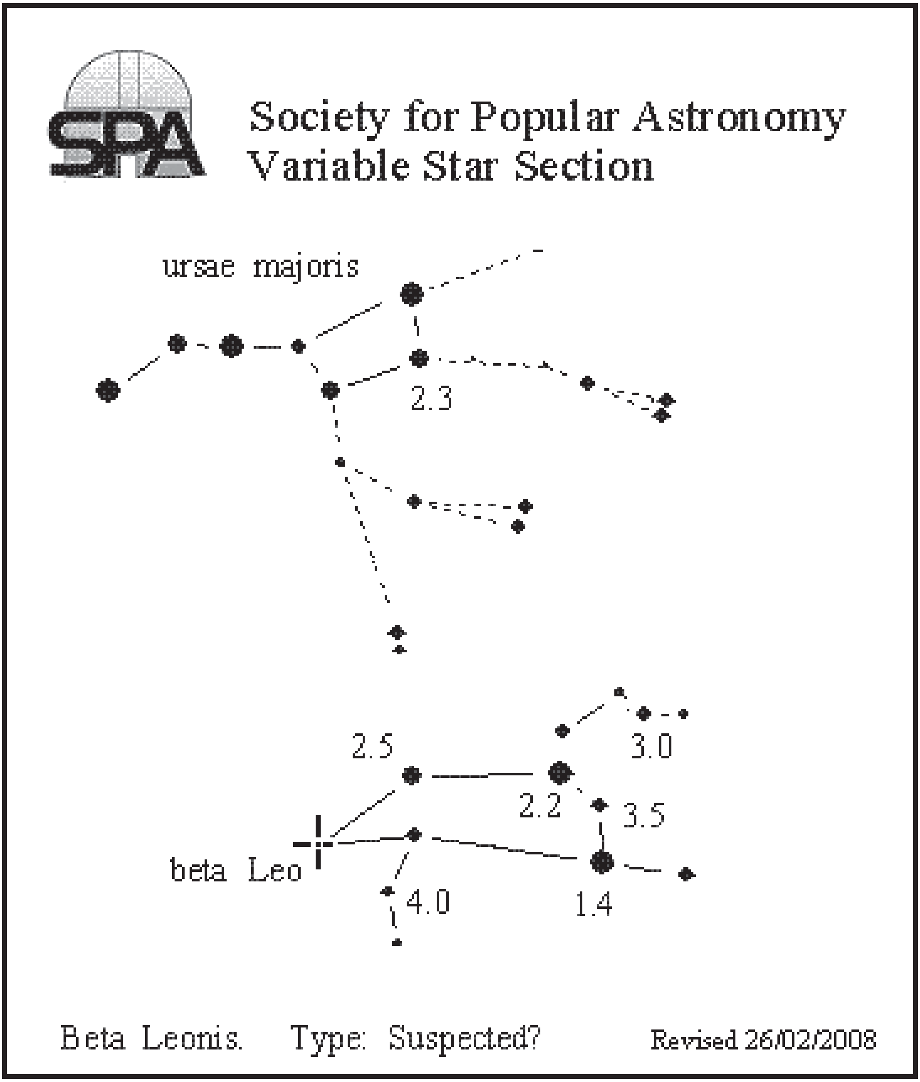
SPA already has visual observers conducting naked eye observations but we feel it will be advantageous if VSS observers also contribute. In addition, it will be useful for observers who have the capability to undertake photometry to submit observations.

The following charts are available from: *http://www.britastro.org/vss/news.htm*



It'll be interesting to see what, if any, variations we see, with what amplitude and with what periodicity.

Richard Miles and Des Loughney have already performed photometry on both stars but it is too early yet to draw any conclusions.



OJ287

This observing campaign has now finished but it must be mentioned that an article has now appeared in that most prestigious journal “Nature”, and that Gary Poyner is listed as one of the authors see:

Nature (Letters) Vol 452/ 17 April 2008 “A massive binary black-hole system in OJ 287 and a test of general relativity” Valtonen et al .

Congratulations Gary for your part in leading the visual observing campaign.

Revisions to Web pages

Finally, members may have noted a slight change to the title page (and one or two others) of the VSS web site. Thanks to Gary Poyner for taking some of the load off Callum Potter and doing this.

ECLIPSING BINARY NEWS.

DES LOUGHNEY

AAVSO Eclipsing Binary Information

The AAVSO have now made available a lot of interesting information on Eclipsing Binaries. For those of us with access to the Internet, the information can be accessed via the AAVSO's web site. If you go to the Home Page, you will see that there is a menu under the heading of '<u>Main Sections of the Web</u>'. If you click on '<u>Observing</u>' you will be shown an article which includes a link to the AAVSO's Eclipsing Binary programme.

When you reach the programme page there is a list of sources of information. There are details of the primary minima timings of many systems. There is a reference to a database of 100 EB charts. This compares with the 74 systems that are on the BAA VSS list. There is a lot of overlap, but does indicate the wide range of observing opportunities for EB enthusiasts. We are now spoilt for choice.

DSLR Photometry and 'V' estimates

In previous EB News, I have reported on the use of DSLR photometry for observing EBs. It is possible to make observations which are more accurate than visual, but less accurate than CCD observations. It seems possible that in good conditions, observations could be made to an accuracy of plus or minus 0.02 magnitude.

At the recent BAAVSS/ AAVSO joint meeting in Cambridge there was some discussion of the potential of DSLR cameras for photometry. It is now accepted that useful observations can be made. Observations followed by analysis of RAW images (after subtracting a master dark frame), using a programme such as AIP4WIN, can produce good results. These are accepted by the AAVSO under the heading of ' CV ' observations.

Green channel

The Director of the AAVSO, Arne Hendon, pointed out that V estimates could be made using the 'green channel' which can be separated from a RAW image using AIP4WIN. Photometry of the 'green channel' is apparently more or less equivalent to a V magnitude. Such estimates will be accepted by the AAVSO as V estimates.

The 'green channel' represents the light that has passed through the green filters that form part of the Bayer filter array that cover all the pixels in a Canon DSLR. The process of examining the 'green channel' is as follows:

1. Open RAW image in AIP4WIN, and calibrate RAW image with appropriate master

dark frame.

2. Look at Bayer Array Tool Palette, click full size RGB image and create colour image. The programme then creates three colour channels of the RAW image. When this process is completed you close the blue channel and the red channel and the original image. You are left with the green channel image.

3. The green channel image can be analysed with the AIP4WIN photometry tools.

I have not yet read any detailed paper on this methodology for producing 'V' estimates. I and others will be working, so that we can advise on the precise methodology to use, to arrive at acceptable estimates. This capability will be useful not only for EB work, but for a variety of variable star observing campaigns.

AI Draconis

This is an EB system on the BAAVSS list. It varies between 7.2 and 8.2 magnitudes, and is thus a binocular object, as well as being circumpolar. With a period of 1.199 days it has frequent eclipses which last for a total of around 4.4 hours. It is classified as an Algol type semi detached system - EA/SD.

The eclipses are reported to be partial, so the light curve should show quite a sharp primary minimum. The system has a gas stream impacting on the primary, and can have irregularities in its light curve. Its period is not constant. The system is well worth observing both visually and with DSLR or CCDs.

The system is straight forward to find. It is near the Draco 'diamond' and is within the binocular field of view of one of the stars of the 'diamond' called Rastaban.

For more information on the system look at the IBVS Bulletins 5279, 5304 and 5355.

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EXPERIMENTS IN THE USE OF A DSLR CAMERA FOR V PHOTOMETRY.

Note from Des Loughney dated 2008 April 28:

Richard,

I have studied four unvarying stars in the AW UMa field, and compared their magnitudes using green channel photometry.

The four stars are:

HIP 56054 - 7.18V - 0.472 B-V
HIP 55741 - 7.72V - 0.382 B-V
HIP 56265 - 7.76V - 1.135 B-V

HIP 56503 - 7.39V - 1.069 B-V

The difference, following analysis of ten images, between HIP 56054 and the others is:

HIP 56054 and HIP 55741 - 0.54m
HIP 56054 and HIP 56265 - 0.69m
HIP 56054 and HIP 56503 - 0.34m.

It will be seen that the difference between HIP 56054 and HIP 55741 is exactly what it should be.

The difference between the others and HIP 56054 is a bit off.

However, the difference between HIP 56265 and HIP 56503 is what is should be.

This suggests that between stars of about the same B-V the green channel is an accurate indicator of V magnitude.

Des

Reply from Richard Miles:

Des,

Your data are very interesting and do reveal something of what is going on here.

First - your choice of stars is a very good one in that you have two stars with a mean B-V colour of 0.43 and two with a mean B-V colour of 1.10. They are also similar in brightness which helps.

The best way to analyse the results is to compare the average result for the redder pair relative to the bluer pair. Here the difference in B-V = 1.10 minus 0.43 = 0.67 mag. Call this δ(B-V).

Now we compare the mean of the measured v magnitudes against the reference V magnitudes. As follows:

Bluer stars: Mean V(bluer) = (7.18+7.72)/2 = 7.45
Redder stars: Mean V(redder) = (7.76+7.39)/2 = 7.575
Difference = 7.575-7.45 = 0.125 mag

So if your system was the same as the Johnson V system you should measure a difference in the mean magnitudes of 0.125 mag.

Let's see what you got...

HIP 56054: v = 7.18
HIP 55741: v = 7.18+0.54 = 7.72
HIP 56265: v = 7.18+0.69 = 7.87
HIP 56503: v = 7.18+0.34 = 7.52

Bluer stars: Mean v(bluer) = (7.18+7.72)/2 = 7.45
Redder stars: Mean v(redder) = (7.87+7.52)/2 = 7.695

Difference = 7.695-7.45 = 0.245 mag

So your camera green channel made the redder stars look fainter than they should be, or alternatively you can say it makes the bluer stars look brighter than they should be (relative to redder stars).

We express the difference in response of your system to the standard, by means of a transformation coefficient, Tv. Specifically for your system, stars that are on average 0.67 mag different in B-V, the difference in v is 0.245 - 0.125 = 0.12 mag.
Now we can express the coefficient in terms of the difference in magnitude if the difference in B-V colour were to be exactly 1.00. In which case we obtain:

Tv = 0.12/0.67 = 0.18

or in other words your system is about 18% different to the standard system.

To convert from your 'v' system to the standard you use the following relationship:

V = v - Tv*(B-V) + constant where Tv = 0.18

So the difference between stars 1 and 2 in general is given by:

V1-V2 = v1-v2 - 0.18*[(B-V)1-(B-V)2] .... Des's transformation equation!

Note that [(B-V)1-(B-V)2] is the same as δ(B-V) as mentioned in paragraph 3 above.

Re. above numbers example:

V1-V2 = 7.695 - 7.45 - 0.18*[1.10-0.43]
V1-V2 = 0.245 - 0.18*0.67
V1-V2 = 0.245 - 0.12
V1-V2 = 0.125 mag

So now you can use this equation in future to reduce your green channel observations to the standard V magnitude. You should find it works reasonably well except for very red stars (B-V > 1.4 say).

I would add that a good astronomical CCD camera and V filter will be closer to the standard system than is your's. Typically you would expect the value to be out by only about 5% (Tv = 0.05). Still it is well worth the compromise given how easy the DSLR is to use and the very wide field and the ability to measure bright stars without too much difficulty.

Cheers,
Richard

John Toone starting his talk at the AAVSO/BAAVSS joint meeting.

CAMBRIDGE UNIVERSITY, NEW HALL COLLEGE JOINT MEETING OF THE AAVSO AND THE BAAVSS

FRIDAY, 11TH APRIL 2008

Morning Session

The BAA President and VSS Director Roger Pickard opened proceedings by welcoming all to this historic joint meeting, he then asked Arne Henden, AAVSO Director, to comment on the event, which he indicated had been in the pipeline for about two years.

Dr. Paula Szkody, AAVSO 1st vice President, Department of Astronomy, University of Washington, was the first speaker.

COORDINATED HUBBLE SPACE TELESCOPE AND GROUND CAMPAIGNS ON CVS.

PAULA SZKODY
(WITH COLLABORATORS ANJUM MUKADAM, BORIS GAENSICKE, ARNE HENDEN + AAVSO OBSERVERS, ATSUKO NITTA, ED SION, TOM HARRISON, RYAN CAMPBELL, STEVE HOWELL)

This talk summarized the results from two projects during the last year that used the

Hubble Space Telescope, and involved many observations from the AAVSO. HST obtained time-resolved ultraviolet spectra, of pulsating, accreting white dwarfs in cataclysmic variables; and of a cataclysmic variable that contained a magnetic white dwarf during a low state (EF Eridani). The AAVSO observations were critical to determine that the objects were at quiescence, or a low state, so that the HST detector would not be harmed. The HST data provided temperature (from the spectra) as well as light curves. Many of the pulsating accretors showed higher temperatures than seen for single non-accreting white dwarfs, leading to different theories about their mass and evolution. In addition, several showed a change in their pulsation properties from past optical observations, indicating that the pulsations change with time, unlike non-accreting pulsators. Finally, the low state observations of EF Eridani showed a peculiar spectrum that will have to be further analysed to reach a conclusion as to whether the white dwarf remains heated during a low state, or cyclotron effects are dominating. Both of these projects showed unanticipated results that reveal we do not yet understand pulsations in accreting white dwarfs nor magnetic field accretion in Polars.

Des Loughney, BAAVSS Eclipsing Binary Secretary

ECLIPSING BINARIES - OBSERVATIONAL CHALLENGES.

DES LOUGHNEY

Several objects visible with binoculars or a small telescope were highlighted together with the speaker's results using a digital SLR.

W Serpentis [8.42 to 10.2 (EA) period 14.1716d] was checked by Des over several clear nights whilst on La Palma. The primary minimum was found to be 5 days out compared with the Krakow ephemeris which has since been updated.

RZ Cassiopeia [6.2 to 7.8 (EA) 1.1952576d] had 38 minima observed since 2005. When four observers' observations (visual, ccd and DSLR) were analysed using the Krakow database elements for 1993 and 2002 a possible decrease in period was indicated. Recent work on the O-C residuals suggests a period that is currently stable.

Some DSLR observations of U Cephei [6.9 to 9.4 (EA/SD) period 2.4930937d], made in 2008, have been plotted on a phase diagram. The observations cover the totality part of the eclipse plus the rising branch. Due to the weather in the UK it had not been possible to cover the falling branch.

A light curve of VW Cephei [7.2 to 7.7 (EW) period 0.2783109d], from 2008 DSLR observations was presented. Various features were evident from the light curve. Unequal maxima and 'shoulders' on the curve suggested the presence of 'star spots'.

BV Draconis [7.88 to 8.48 (EW) period 0.350066568d] seemed to be a challenging and interesting system to observe. However, the light curve that emerged was strange and the system was 0.5 magnitude brighter than expected. The problem was that BV Draconis has a very close companion which also varies. The neighboring star is BW Draconis, another EW type with a range from magnitude 8.61 to 9.08, period 0.2921671d and 16.3' arc separation at 1980.

AW Ursae Majoris [6.84 to 7.06 (EW) period 0.4387260d] is an object for ccd photometry as the light-curve that emerged showed either irregularities or non systematic changes probably the result of mass transfer (ref. IBVS 3540,1999). Although the variation in this system is relatively small it can be followed using DSLR photometry.

The DSLR used was a Canon 350D with a 200mm lens. RAW images were analysed using the differential photometry tools of the AIP4WINv2 software. The observational technique is to use 2 second unfiltered exposures (in the case of AW Ursae Majoris, but 3.2 seconds in the case of U Cephei because of the larger range of the variation). A set of ten images is analysed to work out an average magnitude at a particular time.

Stars to magnitude ~12 are possible to image with an exposure of 30 seconds using the same 200mm lens when it is piggy-backed on an accurately aligned driven mount. Details of the speaker's equipment, camera settings, observations, analysis and potential errors are in BAAVSS Circular no. 133 (2007 September).

The six EBs referred to are good examples of the fairly accurate observations that can be made using DSLRs and undriven exposures of up to 3.2 seconds. Backyard astronomy can result in good science!'

A series of short talks followed:

Dr. Pamela Gay, AAVSO Councillor, Physics Department, Southern Illinois University.

PEER TO PEER ASTRONOMY EDUCATION.

PAMELA GAY

Under various headings, for example, Speakers' and Writers' Bureaus, the speaker's aim was to bring an astronomical content to anyone who asked, possibly seeing the 'educational role' process in evangelical tones. She envisaged an archive of publicly available presentations. Various methods were highlighted, the favourite being an AAVSO live web site which may, for example, allow nearby or overseas' observers to do joint projects from one, or several observing sites. Another view was to assist individuals or societies in creating a lecture, short discussion, or workshop, and helping with a power presentation, or checking what was relevant to a particular star by searching for an appropriate web site. For the benefit of editors requiring a specific theme or image, it would be possible to provide details of a specialist writer or photographic source. Aspects of mentoring, and calendar events like a Star party check, were also mentioned. The speaker had a brief plea for members and attendees to submit a brief biography either in the speaker or writers' corner of the Bureau, or to speak to her during the meeting.

Mike Simonsen, AAVSO Councillor*, in charge of AAVSO VS chart production.*

AAVSO ACRONYMS DE-MYSTIFIED IN FIFTEEN MINUTES.

Mike Simonsen

How VSX, VSD, VSP and AUIDs will work together in synchronicity.

This paper is essentially the history and development of the new chart plotting system implemented by AAVSO.

The Comparison Star Database Project was a volunteer effort to document all the variables, suspected variables and comparison stars on all the existing AAVSO charts. The resulting database of some 36,000 objects eventually evolved into what is now the Variable Star Database (VSD).

Each object in the VSD is assigned a unique identifier for example 101-ABC-203. This is known as the AAVSO Unique Identifier (AUID).

The International Variable Star Index (VSX), was developed concurrently to be the world's most complete up to date index of variable star information. It was originally populated with the data contained in GCVS IV, NSV Supplements, ASAS-3 variables, NSVS red variables, published IBVS variables, Miras and EBs from OGLE-II, bright contact binaries from ROTSE-I. New single objects and catalogues from surveys are constantly being added to the index.

The Variable Star Plotter (VSP), is an online tool for creating customized charts for variable star fields available at the AAVSO website. It uses the Tycho and UCAC 2 data to plot stars, the VSD to label comparison stars, and VSX for specific information on the variables and AUIDs are assigned to each object.

These programs working together in synchronicity form the basis for chart production at the AAVSO for the foreseeable future.

Tea/Coffee break

Coffee break image: Mike Gainsford and Melvyn Taylor

Dr. David Boyd, BAA Treasurer

NEW RESULTS ON SW SEXTANTIS STARS AND A PROPOSED OBSERVING CAMPAIGN.

David Boyd

David Boyd described a project he had been working on with Dr Boris Gaensicke of Warwick University, to update the ephemerides of a number of eclipsing SW Sextantis stars by timing eclipse minima. He began by summarising the observed characteristics of SW Sextantis stars and the various physical interpretations which had been proposed to explain these. The conclusion was that we still do not have a full understanding of these complex systems and the role they play in the evolution of cataclysmic variables.

He then presented preliminary results on two eclipsing SW Sex stars, V1315 Aquilae and V363 Aurigae. O-C analysis including measurements of recent eclipses of V1315 Aql indicate that, while a constant period still provides a good fit to observations over the past 23 years, this period is longer than had previously been reported. On the other hand, recent eclipse timings of V363 Aur clearly show that the period has been reducing over the past 28 years, and a quadratic ephemeris is now required to adequately represent the data.

He finished by describing a proposed concentrated observing campaign on the superhumping SW Sex star, DW Ursae Majoris, to investigate whether there was a correlation between the precession phase of the accretion disc and the depth of eclipses. Observers around the world were being encouraged to undertake time-series CCD photometry of this system over a four week period to achieve as continuous as possible coverage of the light curve. A Google Group called *dwuma* had been set up to provide information about the project and to gather observations.

A WEEK IN THE LIFE OF A REMOTE OBSERVER.

Martin Nicholson

Martin started by explaining what had attracted him to remote observing. He identified three factors; latitude (including the chance to image the southern hemisphere), longitude (observing during the day), and finally the chance to use better equipment than he could justify buying for his own use in light polluted Daventry.

He then moved on to describing how he identified targets of opportunity on a daily basis using the free resources that exist on the Internet. These targets are imaged alongside his long-term projects that include multi-colour imaging of novae and Mira variables.

In the third section of his talk Martin showed examples of the lightcurves he had obtained for a number of his recent targets including R Coronae Borealis during its recent fading episide, and v5558 Sagittarii showing multiple rebrightenings.

In the final part Martin outlined some strengths and weaknesses of remoting observing, and commented - as had a number of other speakers - on how a team based approach to astronomy is particularly rewarding.

http://www.martin-nicholson.info/1/1a.htm

FINDING ECLIPSING BINARIES IN NSVS DATA.

Patrick Wils

Using data from twelve fields (out of 644) from the Northern Sky Variability Survey (NSVS), statistical test functions are derived to find detached and semi-detached eclipsing binaries. Optimal cut-off values are determined for the test functions so that a maximum number of EA type variables are found, while the number of false candidates is minimal. Using these constraints, 24 out of 34 known EA type stars with data in these NSVS fields were recovered, a failure rate of about thirty percent. Five of the stars missed were not recovered because they had too few data points, or no, or only one eclipse, making confirmation of the eclipsing binary type impossible. 106 new EA variables were found in the twelve fields, among which four eclipsing binaries with eccentric orbits. In addition 35 known, and 21 new contact binaries were found. Depending on the field, for each real eclipsing binary, two to five candidates had to be looked at, except for fields observed by the "c" camera for which the number of false candidates is much higher. It is estimated that there are at least 1200 EA variables awaiting discovery in the NSVS fields north of declination +30°. A simple method was presented to find the period for the candidate stars, based on fitting an integer number of cycles between the minima points.

Gary Poyner, Tonny Vanmunster, and Chris Jones

Afternoon Session

John Toone, BAAVSS Chart Secretary

BRITISH VARIABLE STAR ASSOCIATIONS 1848-1908

John Toone

John Herschel (1792-1871) in the 19th century began cataloguing stars and adding to the few dozen variables known in that era. His Outlines of Astronomy (1849) was a direct appeal to observers in a similar way to Argelander's in Schumacher's Yearbook of 1844.

The mid 19th century was a time of variable star discovery by British amateur and professional astronomers. J.R.Hind (1823-1895) born Nottingham took a lead in discovering twenty two new variables and ten asteroids. N.R. Pogson (1829-1891), also from Nottingham had a record of fourteen variables and eight asteroids. As a Government Astronomer in Madras for thirty years, Pogson's name is often associated with the scale whereby one magnitude got defined as the fifth root of a hundred brightness difference, thus meaning that a star of 1st magnitude is a hundred times brighter than a star of 6th magnitude. The discovery of U Geminorum in 1855 was by J.Baxendall (1815-1887) a Manchester amateur, and in addition to 14 other new variables he found g(30)Herculis a naked-eye variable. G. Knott, born (1835) in north London, was to be become a long standing observer monitoring 23 variables for over 30 years. He discovered the long period variable U Cygni (5.9 to 12.1, period 463d) in 1876. A collaboration by Hind, Pogson, Knot ,and Baxendell, on U Geminorum, drew attention to its large and smaller outbursts, also the 'flickering'. A.W.Roberts was a prolific observer of southern hemisphere variables, his reports in 1891 and 1892, contained work on 10 new variables, and his career total was 65,000 observations. Also in 1892 the BAAVSS began a nova search plan.

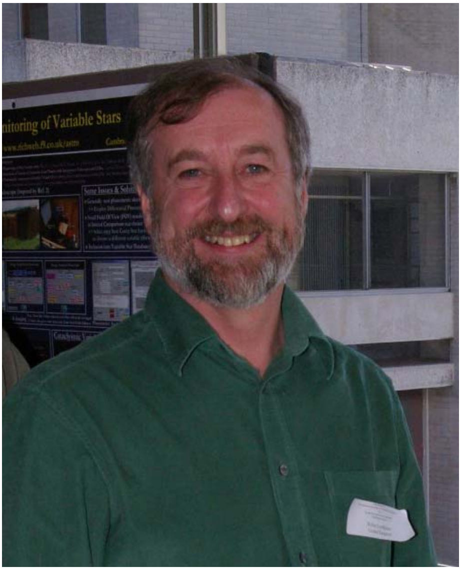
In Monthly Notices of the Royal Astronomical Society (1863 Jan 9), and in the Astronomical Register, an announcement was made about the proposed formation of an "Association for the Systematic Observation of Variable Stars" (ASOVS). Later the same year Knott and Baxendell circulated a "Method of Observing Variable Stars". This had charts with comparison stars, and included other aspects to assist recording, reduction, submission of observations, and simple analysis. However, the ASOVS did not succeed in its aims.

One of the great 'movers' in late 19th century astronomy was Rev'd T.H.E.C. Espin. He founded the Liverpool Astronomical Society, an amateur group aimed at coordinating observations of many objects including variables. E.C.Pickering of Harvard Observatory in 1882, had a plan for securing observations, and at a meeting of the Liverpool A.S. (1883) he spoke about stellar variations and observation. Despite a concerted attempt over a few years to consolidate interest and work in this subject, the LAS could not maintain its momentum and it was only through the formation in 1890 of the British Astronomical Association that a Variable Star Section under J.E.Gore continued the organisation of observers. Gore (1845-1910) had been Director of the LASVSS and was also a discoverer of five new objects. He went on to publish several publications, and not only about variable stars. Col. E.E.Markwick was the VSS Director from 1899 to 1909, and BAA President 1912 to 1914, his method of working was systematic in the manner of its execution, with hundreds of light estimates made. In 1899 it was his proposal to introduce a standard report form for monthly submissions, and the production of a VSS circular for rapid feedback. The programme of observation was expanded and developed early in the new century, and a nova search plan re-introduced in 1903. In 1908 there were 5 Algol type binaries, 9 short periods, 27 long period, and 9 irregular variables on the programme and in the 10 years starting 1900 39,940 observations were made of these stars. The first meeting of the BAAVSS was held 1906 Dec 10th.

"CHASING RAINBOWS" (THE EUROPEAN AMATEUR SPECTROSCOPY SCENE)

ROBIN LEADBEATER

Despite spectroscopy being a vital tool for the professional, amateur spectroscopists are a rare breed, with typically only a handful of active practitioners in any one country. There are a couple of notable exceptions in Europe however. These are the Astronomical



Ring for Access to Spectroscopy (ARAS) in France[1], and the spectroscopy section of the Vereinigung der Sternfreunde (VdS) in Germany.[2] Both groups attract several dozen attendees at their workshops and conferences, and are engaged in Pro-Am projects.

Spectroscopic observations can be made using a range of techniques of varying sophistication:

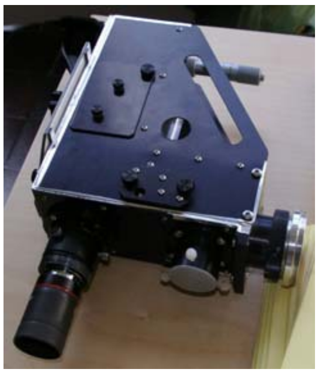
Low resolution but high sensitivity measurements can be made using a simple diffraction grating mounted in a filter wheel.[3] This is suitable for classifying novae and bright supernovae and was used for example to flag up the anomalous behaviour of Var Cas 06, a probable rare near field gravitational microlensing event.[4] Reclassification of red stars of suspect spectral type is another potential application of this simple arrangement.

High resolution spectroscopy (typically less than 1A) of brighter targets is a relatively new area for the amateur, made increasingly popular by the recent introduction of the LHIRES III spectrograph,[5] the first commercial high resolution device for the amateur, and a product of the French ARAS group. This has led to a number of projects in support of professionals during campaigns such as:

The WR140 colliding wind binary Periastron 2008/9[6] (which includes a prolonged amateur observing campaign using the 0.5m MONS telescope on Tenerife)
The Eps Aur Eclipse 2009-1[7,8]
Monitoring of Be stars, both generally,[9,10] and in support of Corot satellite observations.[11]

Be Star spectroscopic data are archived in a database (BeSS)[12], a joint amateur/professional initiative which includes both amateur and professionally recorded spectra. It is hoped that BeSS may form the template for an international database for archiving amateur spectra of a wider range of objects.

Amateurs are also developing the technology, including automating instruments to allow them to be used remotely and designing Echelle spectrographs[13,14] which are capable of simultaneous high resolution measurements over a wide wavelength range.



LHIRES III spectrograph

robin_astro@hotmail.com

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7. *http://www.aavso.org/vstar/vsots/eps_aur.shtml*
8. IBVS 5747: *http://www.konkoly.hu/cgi-bin/IBVS?5747*
9. IBVS 5813: *http://www.konkoly.hu/cgi-bin/IBVS?5813*
10. *http://www.astrosurf.com/buil/us/bestar.htm*
11. *http://www.astrosurf.org/buil/corot/data.htm*
12. *http://basebe.obspm.fr/basebe/*
13. *http://www.eso.org/projects/caos/spectrograph/baches.html*
14. *http://astrosurf.com/buil/echelle/first.htm*

Tea/Coffee break

During breaks Robin Leadbeater's LHIRES III spectrograph was trained on our nearest star from the comfort of the conference venue interior. Myriads of Fraunhofer lines were clearly visible, resolved down to sub Angstrom level.

LONG TERM MONITORING AND THE CARBON MIRAS.

Dr. Tom Lloyd Evans

Visual observations of red variable stars, which in some cases span more than a hundred years, show fadings of up to three magnitudes, which may last for several regular cycles of a carbon-rich variable. These are known to result from dust clouds produced by the star. Spectra of the Miras/SRA: R Leporis, R Fornacis, R Sculptoris and V Hydrae, and the SRB: T Muscae, were taken at the South African Astronomical Observatory about every four months during 1986-2001. R Fornacis, R Leporis and V Hydrae underwent fadings, during which the resonance lines of NaD, KI, and RbI and the (0,0) bandhead of C_2 appeared in emission, with strength proportional to the decline, indicating the presence of gas which was presumably ejected when the dust was formed. In V Hydrae, in which fadings occur regularly in an eighteen year period, the fading was preceded by a spectral change, suggesting that a mass of hot gas had reached the photospheric level. It has been proposed that V Hydrae has a companion, which eclipses the carbon star every eighteen years. The companion is identified on the spectra as an accretion disk around an unseen star; it fades with the carbon star and cannot be responsible for the eclipse, so that the fading, like those in the other probably non-periodic stars, must arise from causes intrinsic to the carbon star. R Sculptoris shows neither fadings not line emission. T Muscae shows emission confined to shorter wavelengths, in particular of the (1,0) band of C_2, whereas the intrinsically stronger (0,0) band is less affected. The hot bands of SiC_2 are weakened relative to other bands of this molecule, and some unidentified emission lines appear, all during fadings which recur, with very variable depth and duration, in a period of 1082 days. The preferential appearance of the (1,0) band of C_2 is similar to the behaviour in the regular pulsation cycle of the Miras, and suggests that the long period in this star is intrinsic and not the result of the star being in a binary system, for which there is no direct evidence.

Boris Gaensicke, University of Warwick

CATACLYSMIC VARIABLES FROM LARGE SURVEYS: A SILENT REVOLUTION

Dr. Boris Gaensicke

A large fraction, fifty percent or more, of all stars in the sky are in binary or multiple systems, and many exotic high-energy events. For instance supernovae type Ia, are the thermonuclear explosions of white dwarfs that have been accreting from a companion star, or possibly mergers of two white dwarfs. Yet, despite an enormous progress in our ideas about the evolution of single stars, we still do not understand very well the interactions that occur in binary stars, and the effects that those interactions have on the evolution of the stellar components.

Cataclysmic variables (CVs), in which a white dwarf accretes from a low-mass companion

star, are numerous, and relatively bright. We believe that we have fairly good ideas about the general properties of white dwarfs and low mass stars. Therefore, CVs represent an excellent class of stars to study both binary evolution, and the physics of accretion/interaction, and what we learn from such studies can (hopefully) be extrapolated to other, more exotic binaries, such as neutron stars or black hole binaries.

The discovery of the first CVs goes back more than 150 years, and since the very first days, amateurs have played an important role in both finding new CVs, as well as continuously monitoring the brightness variation of those already known.

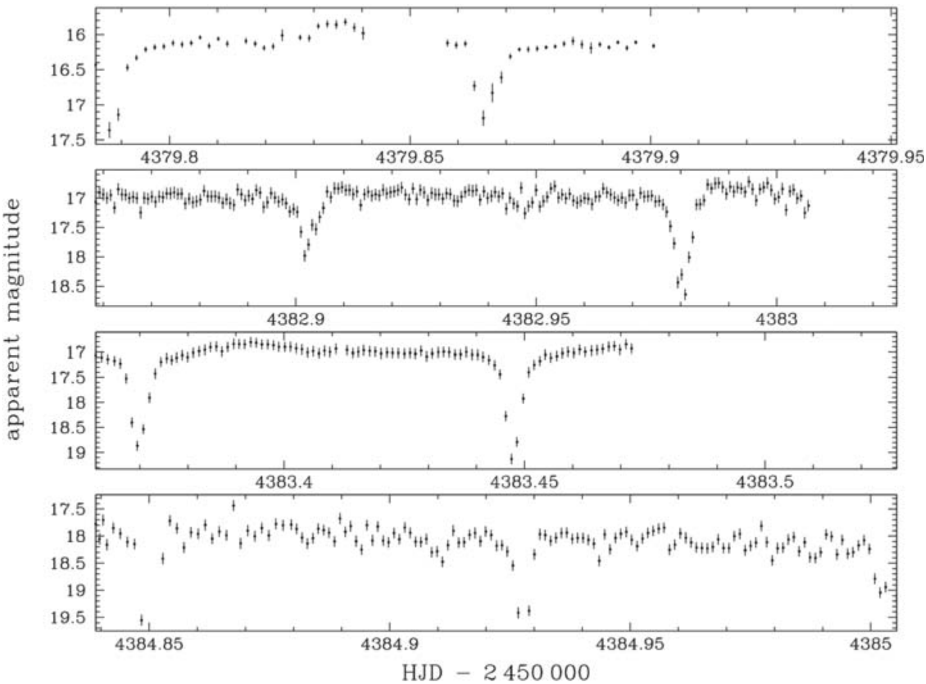
The family of CVs has been growing more rapidly since large surveys of the skies, both from the ground as well as from space, at optical wavelengths and in X-rays, identified new systems by the dozens. Yet, despite intense efforts by professional and amateur astronomers, matching the overall properties of the observed CV population to those predicted by theory has been of little success for the past three decades.

A real breakthrough is currently underway, with the Sloan Digital Sky Survey finding more (250 and counting), and fainter CVs than any other investigation before. Detailed follow-up studies of roughly half of the SDSS CVs have been done so far, and it turns out that their properties agree fairly well with the long-standing predictions by the theoretical models.

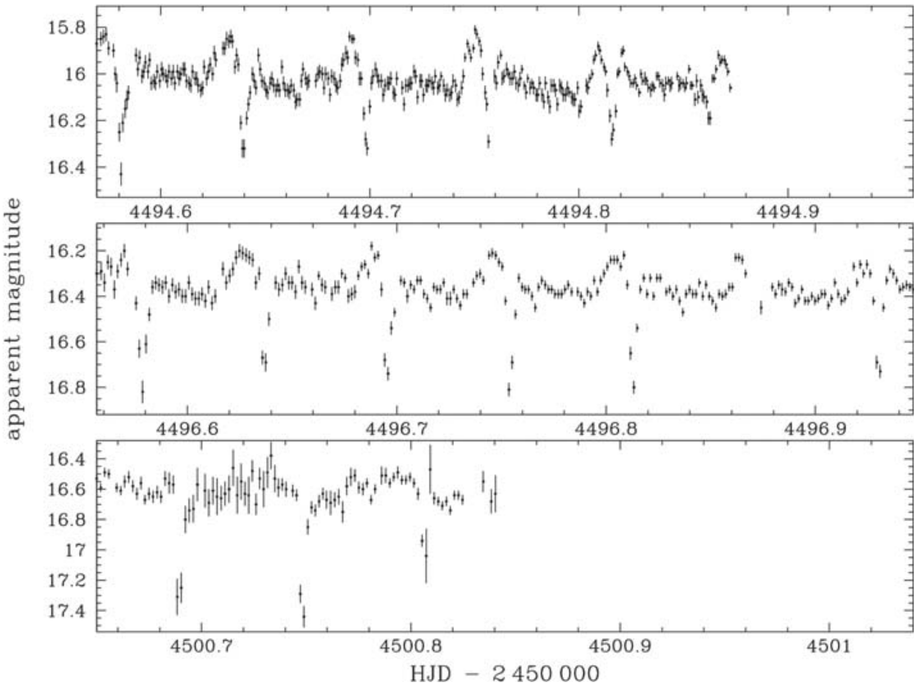
I think the following two light curves are a nice example of the fantastic data quality that amateurs are getting out of their equipment. Our group in Warwick had observed both of these systems in quiescence, and identified them as eclipsing CVs. However, our coverage was limited, so we did not have very accurate ephemerides. While writing a paper on CVs from SDSS, Steve Brady, who is running an automated system that regularly looks at a number of SDSS CVs, detected both stars in their first observed outbursts. He, Tom Krajci and Arto Oksanen started time-series photometry following the initial alert, obtaining enough eclipse timings to allow the determination of an accurate eclipse ephemeris that goes back to our quiescent data.

Our quiescent data, plus Steve's, Tom's and Arto's outburst date were then published together in *Dillon et al. 2008, MNRAS 386, 1568*, also available on *arxiv:0803.0010*. This is a fine example of pro-am collaboration in the context of characterising new cataclysmic variables identified in large surveys.

Light curves of two eclipsing dwarf novae obtained by Steve Brady, Tom Krajci, and Arto Oksanen using 28cm to 40cm telescopes equipped with CCD cameras. Plots by Boris Gaensicke.



SDSS J090103.93+480911.1
orbital period = 112.3min, quiescent g-magnitude = 19.9



SDSS J125023.84+665525.4
orbital period = 84.6min, quiescent g-magnitude = 18.7

Friday Evening Informal lecture:

Michael F. Bode - Director Astrophysics Research Institute and Professor of Astrophysics, Liverpool John Moores University.

THE EXPLOSIONS OF THE RECURRENT NOVA: RS OPHIUCHI.

Mike Bode

The Recurrent Nova RS Ophiuchi underwent its first recorded outburst for twenty one years in February 2006. The explosion occurs due to a thermonuclear runaway event on the surface of a white dwarf star. About an Earth mass of material is ejected at velocities of order 4000 km/s into the wind of a companion Red Giant, setting up shock systems. The evolution we observe across the electromagnetic spectrum is then like a supernova remnant in miniature - evolving on timescales of months rather than millennia. The white dwarf is also thought to be near to the Chandrasekhar mass limit and one of the big questions is whether net mass is being added over time, despite the ejection of material at outburst, thus ultimately leading to a Type Ia supernova explosion.

The 2006 outburst led to an international observing campaign that used all the major space observatories, plus many on the ground. The Astrophysics Research Institute at Liverpool John Moores University, was part of the large international collaboration that rapidly put the campaign in place, and have led the Swift, the Hubble Space Telescope, and Liverpool Telescope follow-up in particular. With Swift, we detected the outburst itself with the satellite's Burst Alert Telescope (the first time this has been accomplished for any nova), followed the evolution of the shocks as they traversed the red giant wind, and made the first detection of the Super Soft Source, arising we think from continued nuclear burning on the surface of the white dwarf (*see Bode et al. 2006, ApJ 652, 629*). Indeed, RS Ophiuchi proved to be the brightest Super Soft Source ever observed.

Our July 2006 Hubble Space Telescope observations revealed for the first time the presence of a double-ringed structure, apparently expanding at several thousand kilometres per second, with total extent around 0.4 arcseconds. Comparison with very-long-baseline interferometry radio observations (which were able to investigate the structure of the remnant down to Solar System size scales at RS Ophiuchi's distance of 1.6 kpc - see *O'Brien et al., 2006, Nature 442, 279*), together with a simple bipolar structure model, suggests that the medium into which the ejecta expand is much denser in the plane of the binary star orbit than at right angles to it (see *Bode et al. 2007, ApJ 665, L63*). This is in line with models of Planetary Nebulae with binary star nuclei and is in fact consistent with recent observational work on the evolution of ejecta in Type Ia supernovae.

We have continued our monitoring with Swift and the Liverpool Telescope well into the current quiescent phase, investigating amongst other aspects the re-establishment of accretion between the companion stars. Such studies, together with detailed modelling of the Super Soft Source emission and the interaction of the ejecta with the cirumstellar medium, will help us to determine whether the white dwarf is indeed gaining mass. In addition, ongoing analysis of spectroscopic data, including those from the X-ray, aims to reveal whether the white dwarf was of the CO variety, another necessary condition if this object, and therefore this type of recurrent nova in general, might thus be SNIa progenitors.

www.astro.livjm.ac.uk

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Fax: +44 (0)151-231 2921

Photographs:
Melvyn Taylor: Gary Poyner with DY Per in "From the Director", John Toone portrait.
Rob Januszewski: All other photographs, apart from inside front cover.

I would like to thank the speakers who supplied summaries of their talks, and Melvyn Taylor for the tremendous task of writing a great deal of this report, and putting it together, and both Rob and Melvyn for the photographs which help to bring it alive.

Saturday was another full day of interesting talks, culminating with a banquet, the awards, and a surprise After Dinner lecture, an excellent end to the evening. A report will be published in the Journal of the British Astronomical Association.

VISITORS FROM OVERSEAS

Arto Oksanen from Finland discovered the afterglow of a Gamma Ray Burst: GRB071010B

Arne Henden, Director of the AAVSO, and Rebecca Turner, AAVSO Astronomical Technical Assistant and Meeting Coordinator, USA.

Erwin Van Ballegoij from the Netherlands, and Andrzej Arminski, a yacht designer, from Poland.

RHO CASSIOPEIAE 1982 TO 1991.

MELVYN TAYLOR

RA 23h 54m Dec +57* 29’ (2000), type 4.1 to 6.2, period 320d.
Chart ref. seq. no. 064.01

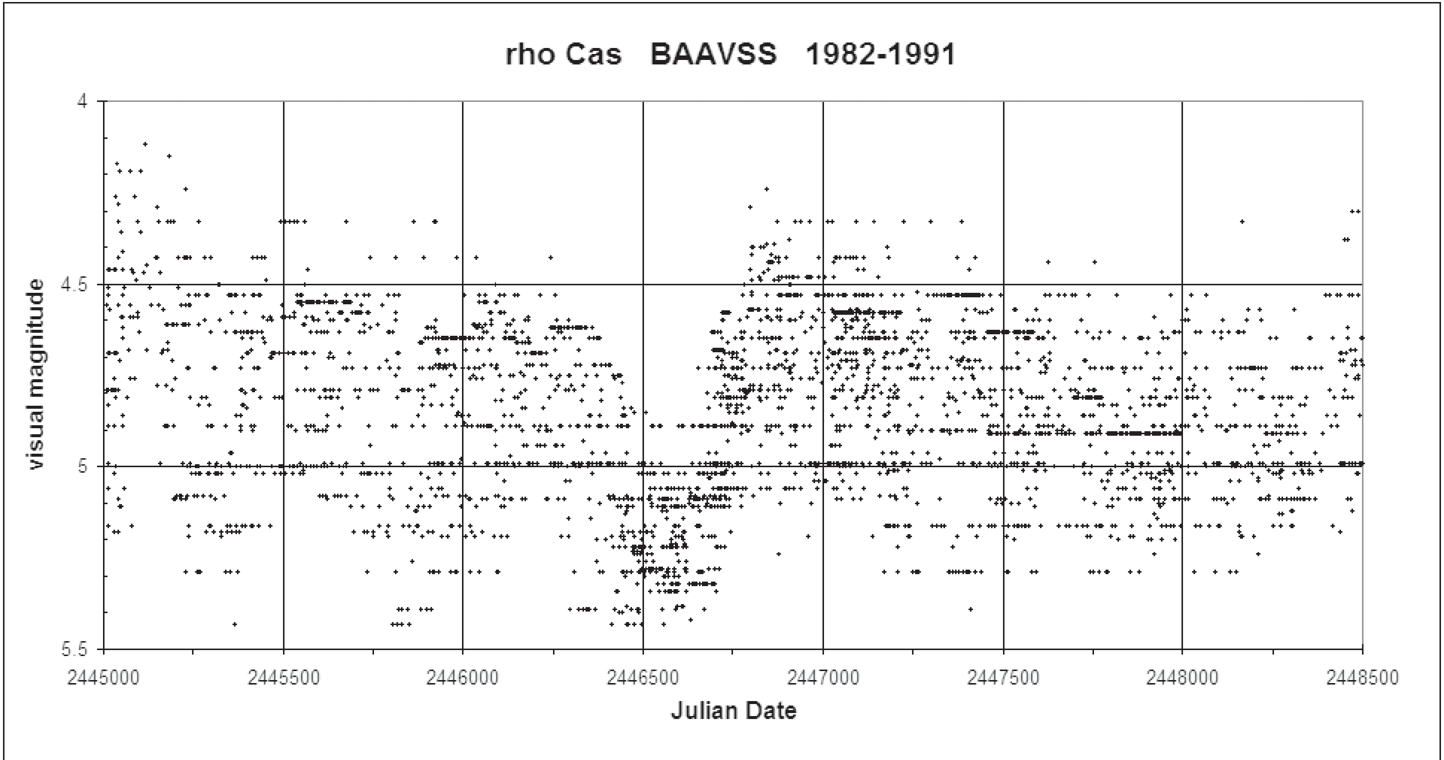


Figure 1: rho Cas, scattered magnitude.

Observers:

Albrighton, Allen, Baransky, Barrett, Bibbings, Billington, Bone, Bouma, Brelstaff, Brundle, Bueno, Crawford, Day, Duncan, Espey, Fraser, Gavine, Granslo, Hapgood, Hawkins, Henshaw, Hufton, Hurst, Hutchings, Isles, Kendall, Kiernan, Knight, Kocsis, Loughney, Maris, Markham, Meacham, Middlemist, Minty, Moore, Munden, Nartowicz, Pickard, Pointer, Price, Ramsey, Ridley, Saville, Smeaton, Stephanopoulos, Stott, Tanti, Taylor, Thorpe, Toone, Waddling, Wanstall, West, Wheeler, Worraker.

The significant fade of 1984 April and the semi-regular variations are highlighted in the 30d mean magnitude plot covering 1984 to 1989 below:

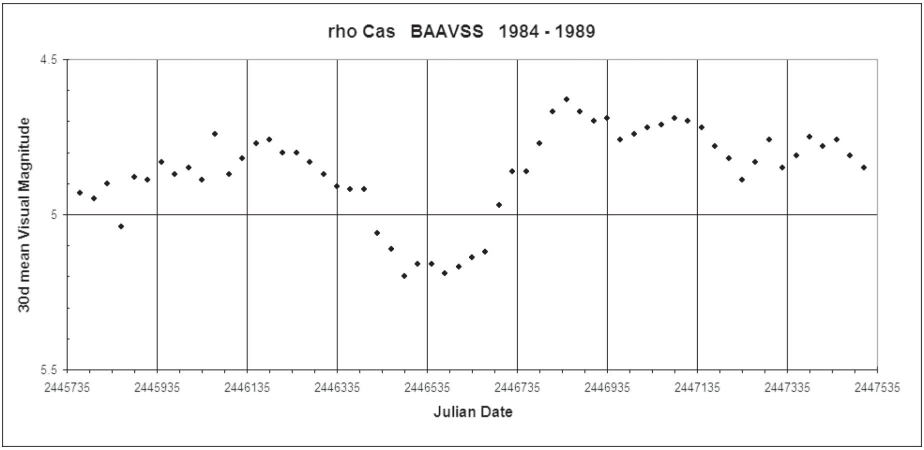


Figure 2: rho Cas, 30d mean magnitude

SX HERCULIS LIGHT CURVE.

MELVYN TAYLOR

RA 16h 08m Dec. 24* 55’, type SRD, 8.0-9.2, period 103d.
Chart ref. seq. no.: 113.01

Observers:

Stephanopoulos, Albrighton, Allmand, Bell, Bone, Charleton, Currie, Evans, Farrer, Fleet, Fraser, Gough, Hoare, Hollis, Hornby, Horsley, Hurst, Isles, Johnston, Lloyd, Markham, Matthews, McNaught, Middlemist, Pointer, Porter, Saville, Taylor, Toone, West, Wise, Worraker, Young, Allen, Baransky, Beesley, Gardner, Granslo, Hufton, Jobson, Pezzarossa, Pickup, Rothery, Smith.

Stellar Data:

GCVS [M.D.Taylor, 2008 Jan 31and 2008 Apr 28]

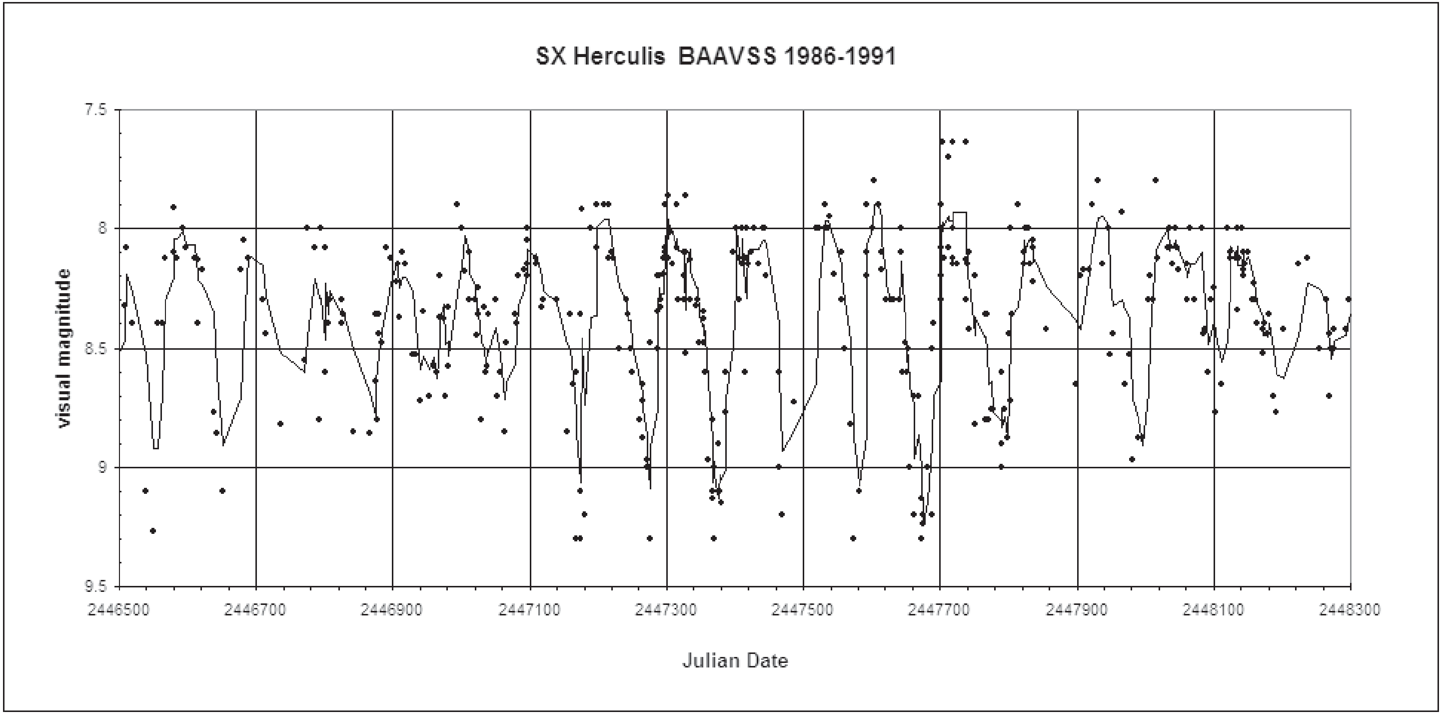
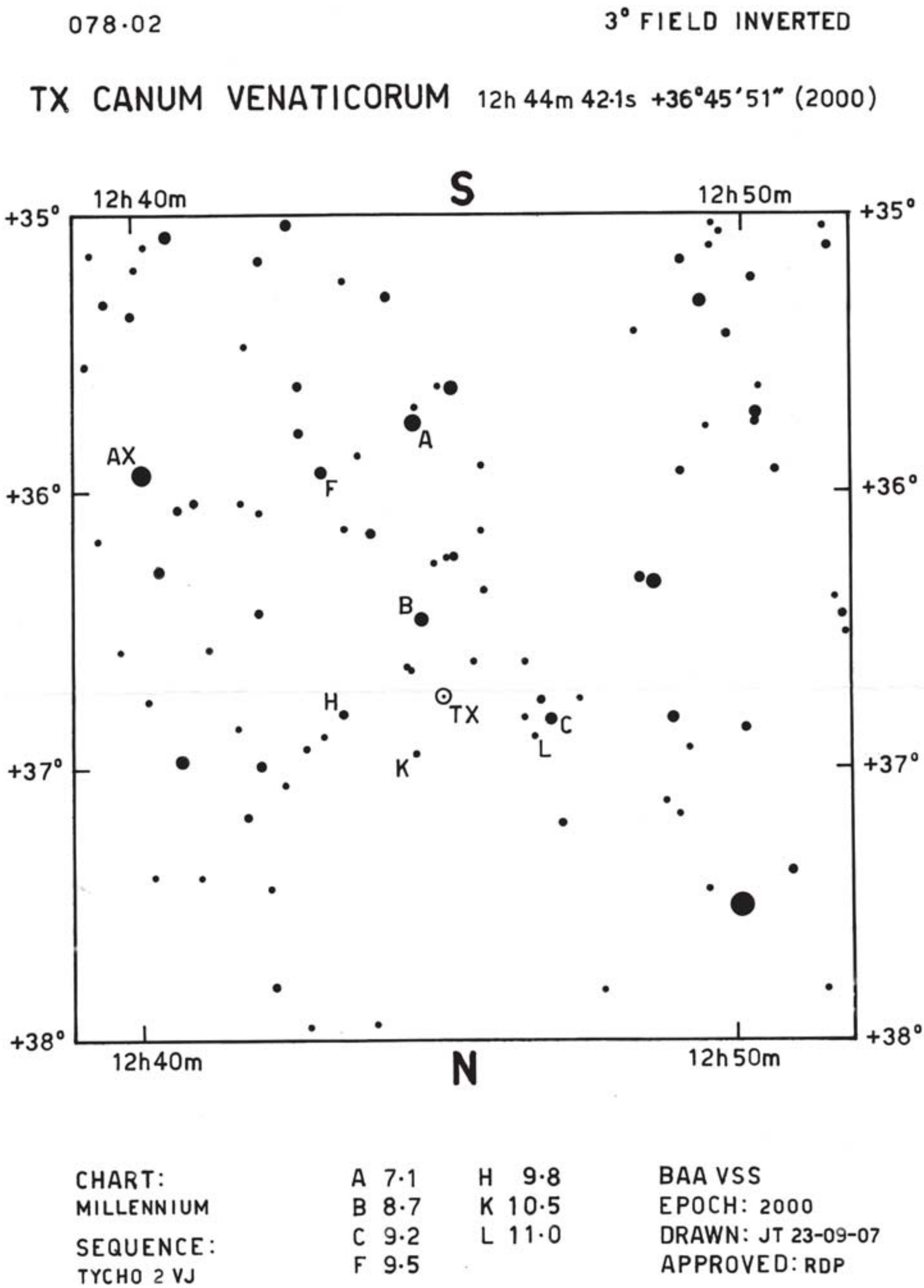


Figure 1: SX Herculis.

NEW CHART

JOHN TOONE



BINOCULAR PRIORITY LIST

MELVYN TAYLOR

(Includes *XX Cam*, *Mira*, *R CrB*, and *R Hya* which are also on the telescopic programme)

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog.
AQ	***And***	00 28 +35 35	8.0-8.9	SR	346d	303.01	
EG	***And***	00 45 +40 41	7.1-7.8	ZAnd		072.01	
V	***Aql***	19 04 -05 41	6.6-8.4	SRb	353d	026.04	
UU	***Aur***	06 37 +38 27	5.1-6.8	SRb	234d	230.01	
AB	***Aur***	04 56 +30 33	6.7-8.4	Ina		301.01	
V	***Boo***	14 30 +38 52	7-12	Sra	258d	037.01	
RW	***Boo***	14 41 +31 34	7.4-8.9	SRb	209d	104.01	
RX	***Boo***	14 24 +25 42	6.9-9.1	SRb	160d	219.01	
ST	***Cam***	04 51 +68 10	6.0-8.0	SRb	300d?	111.01	
XX	***Cam***	04 09 +53 22	7.3-9.7	RCB		068.01	T/B
X	***Cnc***	08 55 +17 04	5.6-7.5	SRb	195d	231.01	
RS	***Cnc***	09 11 +30 58	5.1-7.0	SRc	120d?	269.01	
V	***CVn***	13 20 +45 32	6.5-8.6	SRa	192d	214.02	
WZ	***Cas***	00 01 +60 21	6.9-8.5	SRb	186d	1982Aug16	
V465	***Cas***	01 18 +57 48	6.2-7.8	SRb	60d	233.01	
γ	***Cas***	00 57 +60 43	1.6-3.0	GCAS		064.01	
Rho	***Cas***	23 54 +57 29	4.1-6.2	SRd	320d	064.01	
W	***Cep***	22 37 +58 26	7.0-9.2	SRc		312.01	
AR	***Cep***	22 52 +85 03	7.0-7.9	SRb		1985May06	
Mu	***Cep***	21 44 +58 47	3.4-5.1	SRc	730d	112.01	
O	***Cet***	02 19 -02 59	2.0-10.1	M	332d	039.02	T/B
R	***CrB***	15 48 +28 09	5.7-14.8	RCB		041.03	T/B
W	***Cyg***	21 36 +45 22	5.0-7.6	SRb	131d	062.03	
AF	***Cyg***	19 30 +46 09	6.4-8.4	SRb	92d	232.01	
CH	***Cyg***	19 25 +50 15	5.6-10.5	ZAnd+SR	97	089.02	
U	***Del***	20 46 +18 06	5.6-7.9	SRb	110d?	228.01	
EU	***Del***	20 38 +18 16	5.8-6.9	SRb	60d	228.01	
TX	***Dra***	16 35 +60 28	6.6-8.4	SRb	78d?	106.02	
AH	***Dra***	16 48 +57 49	7.0-8.7	SRb	158d	106.02	
NQ	***Gem***	07 32 +24 30	7.4-8.0	SR+ZAnd	70d?	077.01	
X	***Her***	16 03 +47 14	6.1-7.5	SRb	95d	223.01	
SX	***Her***	16 08 +24 55	8.0-9.2	SRd	103d	113.01	
UW	***Her***	17 14 +36 22	7.0-8.8	SRb	104d	107.01	
AC	***Her***	18 30 +21 52	6.8-9.0	RVA	75d	048.03	
IQ	***Her***	18 18 +17 59	7.0-7.5	SRb	75d	048.03	
OP	***Her***	17 57 +45 21	5.9-7.2	SRb	120d	1984Apr12	
R	***Hya***	13 30 -23 17	3.5-10.9	M	389d	049.02	T/B
RX	***Lep***	05 11 -11 51	5.0-7.4	SRb	60d?	110.01	
Y	***Lyn***	07 28 +45 59	6.5-8.4	SRc	110d	229.01	
SV	***Lyn***	08 84 +36 21	6.6-7.9	SRb	70d?	108.03	
U	***Mon***	07 31 -09 47	5.9-7.9	RVB	91d	029.03	
X	***Oph***	18 38 +08 50	5.9-9.2	M	328d	099.01	
BQ	***Ori***	05 57 +22 50	6.9-8.9	SR	110d	295.01	

Variable		RA (2000) Dec	Range	Type	Period	Chart	Prog.
AG	***Peg***	21 51 +12 38	6.0-9.4	Nc		094.02	
X	***Per***	03 55 +31 03	6.0-7.0	GCas+Xp		277.01	
R	***Sct***	18 48 -05 42	4.2-8.6	RVA	146d	026.04	
Y	***Tau***	05 46 +20 42	6.5-9.2	SRb	242d	295.01	
W	***Tri***	02 42 +34 31	7.5-8.8	SRc	108d	114.01	
Z	***UMa***	11 57 +57 52	6.2-9.4	SRb	196d	217.02	
ST	***UMa***	11 28 +45 11	6.0-7.6	SRb	110d?	102.02	
VY	***UMa***	10 45 +67 25	5.9-7.0	Lb		226.01	
V	***UMi***	13 39 +74 19	7.2-9.1	SRb	72d	101.01	
SS	***Vir***	12 25 +00 48	6.9-9.6	SRa	364d	097.01	
SW	***Vir***	13 14 -02 48	6.4-8.5	SRb	150d?	098.01	

* *

ECLIPSING BINARY PREDICTIONS

Des Loughney

The following predictions, based on the latest Krakow elements, should be usable for observers throughout the British Isles. The times of mid-eclipse appear in parentheses, with the start and end times of visibility on either side. The times are hours UT, with a value greater than 24 indicating a time after midnight. D indicates that the eclipse starts/ ends in daylight; L indicates low altitude at the start/end of the visibility and << indicates that mid eclipse occurred on an earlier date.

Please contact the EB secretary if you require any further explanation of the format.

The variables covered by these predictions are :

RS CVn	7.9 - 9.1V	AI Dra	7.2 - 8.2	U Sge	6.45 - 9.28V
TV Cas	7.2 - 8.2V	Z Vul	7.25 - 8.90V	RW Tau	7.98 - 11.59V
U Cep	6.8 - 9.4	Z Dra	10.8 - 14.1p	HU Tau	5.92 - 6.70V
U CrB	7.7 - 8.8V	TW Dra	8.0 - 10.5v	X Tri	8.88 - 11.27V
SW Cyg	9.24 - 11.83V	S Equ	8.0 - 10.08V	TX Uma	7.06 - 8.80V
V367 Cyg	6.7 - 7.6V	Z Per	9.7 - 12.4p		

Note that predictions for RZ Cas, Beta Per and Lambda Tau can be found in the BAA Handbook.

For information on other eclipsing binaries see the website:
http://www.as.ap.krakow.pl/o-c/index.php3
Again please contact the EB secretary if you have any queries about the information on this site and how it should be interpreted.

July

2008 Jul 1 Tue
V367Cyg.D22(16)26D
SW Cyg...D22(23)26D
TV Cas.......24(28)26D

2008 Jul 2 Wed
U CrB........01(07)02D
RW Tau...L02(<<)02D
V367Cyg.D22(<<)26D
AI Dra........D22(22)23
TX UMa.D22(27)26D
del Lib......D22(27)24L
S Equ..........23(28)26D
Y Psc........L23(24)26D

2008 Jul 3 Thu
Z Per...........00(05)02D
TW Dra......02(07)02D
TV Cas....D22(23)26D

2008 Jul 4 Fri
AI Dra........02(03)02D
Z Dra.........D22(22)24
Z Vul.......D22(26)26D

2008 Jul 5 Sat
X Tri..........02(04)02D
U CrB........ D22(18)23
TV Cas.......D22(19)23
U Cep......D22(26)26D
TW Dra...D22(26)26D
TX UMa....23(28)26D

2008 Jul 6 Sun
X Tri..........01(04)02D
Z Per...........02(06)02D
RS CVn...D22(28)26D

2008 Jul 7 Mon
X Tri..........01(03)02D
U Sge..........D22(19)24
del Lib......D22(19)24L
X Tri..........24(26)26D

2008 Jul 8 Tue
TW Dra...D22(21)26D
AI Dra........D22(22)23
Z Dra..........D22(23)26
U CrB.........23(28)26D
X Tri........L23(26)26D

2008 Jul 9 Wed
TX UMa....01(06)02D
Z Vul.......D22(24)26D
S Equ.......D22(25)26D
del Lib......D22(26)24L
X Tri........L23(25)26D

2008 Jul 10 Thu
AI Dra........01(03)02D
RW Tau......02(06)02D
U Cep.....D22(26)26D
SW Cyg...D22(27)26D
U Sge..........22(28)26D
X Tri........L23(24)26D

2008 Jul 11 Fri
TV Cas.......01(05)02D
TW Dra......D22(17)22
RS CVn...D22(23)26D
X Tri...........L23(24)26

2008 Jul 12 Sat
TV Cas....D22(25)26D
Z Dra.........23(25)26D
X Tri...........L23(23)25

2008 Jul 13 Sun
RW Tau....L01(01)02D
X Tri...........L23(22)25

2008 Jul 14 Mon
Y Psc..........02(07)02D
del Lib.....D22(18)23L
TV Cas.......D22(20)25
AI Dra........D22(22)23
Z Vul.......D22(22)26D
X Tri..........L23(22)24

2008 Jul 15 Tue
SS Cet.....L02(<<)02D
SW Cyg......D22(16)22
U Cep.....D22(25)26D
U CrB.....D22(26)26D
X Tri...........L23(21)23

2008 Jul 16 Wed
AI Dra........01(03)02D
RS CVn......D22(18)25
S Equ.......D22(22)26D
del Lib.....D22(26)23L

2008 Jul 17 Thu
Z Dra.........01(03)02D
U Sge.......D22(22)26D
Y Psc.......L22(25)26D

2008 Jul 18 Fri
SS Cet.....L02(<<)02D
V367Cyg.D22(54)26D

2008 Jul 19 Sat
Z Vul..........D22(20)25
Z Dra.........D22(20)22
V367Cyg.D22(30)26D
TW Dra......22(27)26D

2008 Jul 20 Sun
SW Cyg......00(06)02D
V367Cyg.D22(06)26D
AI Dra........D22(22)23
U Cep......D22(25)26D

2008 Jul 21 Mon
U Sge..........01(07)02D
SS Cet......L02(<<)02D
Z Dra..........02(05)02D
V367Cyg.D22(<<)26D
del Lib......D22(18)23L
Y Psc...........L22(19)24
TV Cas.......22(26)26D

2008 Jul 22 Tue
AI Dra........01(02)02D
Z Vul...........01(07)02D
TW Dra...D21(22)27D
U CrB......D21(24)27D

2008 Jul 23 Wed
S Equ..........D21(19)24
Z Dra..........D21(22)24
TV Cas.......D21(22)26
del Lib......D21(26)23L

2008 Jul 24 Thu
RW Tau....L00(03)03D
SS Cet.........L02(<<)02
U Sge..........D21(16)22
Z Vul...........D21(18)23
SW Cyg......D21(20)26

2008 Jul 25 Fri
TV Cas.......D21(17)22
TW Dra......D21(18)23
U Cep......D21(25)27D

2008 Jul 26 Sat
AI Dra........D21(22)23
Z Vul...........23(28)27D
S Equ..........24(29)27D

2008 Jul 27 Sun
RW Tau.......L00(<<)02
SS Cet.........L01(<<)02
Z Dra..........D21(24)26
U Sge.......D21(25)27D

2008 Jul 28 Mon
AI Dra........01(02)03D
del Lib......D21(17)22L

2008 Jul 29 Tue
U CrB.......D21(22)27L

2008 Jul 30 Wed
Z Per..........D21(17)22
U Cep.....D21(24)27D
del Lib.....D21(25)22L
RS CVn......21(28)25L
TV Cas......24(28)27D

2008 Jul 31 Thu
Z Vul......D21(26)27D
Z Dra.........23(25)27D

August

2008 Aug 1 Fri
AI Dra.......D21(21)23
TV Cas...D21(23)27D
Y Psc.........22(27)27D

2008 Aug 2 Sat
TX UMa...D21(18)22
Z Per..........D21(19)23
SW Cyg..D21(23)27D
S Equ......D21(26)27D
TW Dra.....23(28)27D

2008 Aug 3 Sun
AI Dra.......01(02)03D
TV Cas......D21(19)23
U Sge D21(20)25
RW Tau......24(28)27D

2008 Aug 4 Mon
HU Tau......L01(<<)02
del Lib.....D21(17)22L
RS CVn...D21(23)25L
U Cep.....D21(24)27D

2008 Aug 5 Tue
Z Dra.........01(03)03D
TX UMa...D21(19)24
U CrB........D21(19)25
Z Per..........D21(20)25
Y Psc.........D21(21)25
TW Dra..D21(23)27D
Z Vul.......D21(24)27D
V367 Cyg..24(69)27D

2008 Aug 6 Wed
HU Tau......L01(<<)03
del Lib.....D21(25)22L
V367Cyg.D21(45)27D
U Sge.........23(29)27D
RW Tau...L23(23)27D

2008 Aug 7 Thu
X Tri..........03(05)03D
Z Dra.........D21(20)23
V367Cyg.D21(21)27D
AI Dra.......D21(21)23

2008 Aug 8 Fri
HU Tau....L01(01)03D
X Tri..........02(05)03D
V367Cyg.D21(<<)27D
TW Dra......D21(18)23
TX UMa..D21(21)24L
Z Per...........D21(21)26
2008 Aug 9 Sat
U CrB.........00(06)02L
AI Dra........01(02)03D
X Tri..........01(04)03D
TV Cas.......01(05)03D
Z Dra..........02(05)03D
RS CVn....D21(18)24L
S Equ.......D21(23)27D
U Cep......D21(24)27D
2008 Aug 10 Sun
HU Tau....L01(02)03D
X Tri..........01(03)03D
Z Vul.......D21(22)27D
TV Cas.......21(25)27D
X Tri..........24(26)27D
2008 Aug 11 Mon
del Lib......D21(16)22L
Z Dra.........D21(22)24
TX UMa..D21(22)24L
Z Per........D21(23)27D
SW Cyg......21(27)27D
X Tri..........23(26)27D
2008 Aug 12 Tue
HU Tau....L00(03)03D
TX UMa....L03(<<)03
U CrB........D21(17)23
TV Cas.......D21(20)25
X Tri..........23(25)27D
2008 Aug 13 Wed
AI Dra........D21(21)22
U Sge.......D21(23)27D
del Lib......D21(24)21L
X Tri............22(24)27
2008 Aug 14 Thu
HU Tau......01(05)03D
U Cep......D21(23)27D
TX UMa..D21(24)24L
Z Per........D21(24)27D
X Tri............21(24)26

2008 Aug 15 Fri
AI Dra..........01(02)03
RW Tau.....01(06)03D
TX UMa.L02(00)03D
Z Vul.........D20(20)25
X Tri..........L21(23)26
Z Dra............21(24)26
U CrB........22(28)25L
2008 Aug 16 Sat
HU Tau.....02(06)03D
SW Cyg.....D20(17)23
S Equ.........D20(20)25
X Tri..........L21(22)25
TW Dra.....23(29)27D
Y Psc.........24(28)27D
2008 Aug 17 Sun
U Sge.........02(08)03D
Z Per..........21(25)28D
TX UMa...21(25)24L
X Tri..........L21(22)24
RW Tau...L23(25)28D
2008 Aug 18 Mon
Z Vul.........01(07)04D
TX UMa.L02(01)04D
TV Cas......03(07)04D
HU Tau.....03(07)04D
del Lib.....D20(16)21L
X Tri..........L21(21)23
2008 Aug 19 Tue
U CrB........D20(15)20
AI Dra.......D20(21)22
U Cep.....D20(23)28D
TW Dra..D20(24)28D
X Tri..........L21(20)23
TV Cas......22(26)28D
Z Dra.........23(25)28D
2008 Aug 20 Wed
S Equ.........01(07)04D
U Sge.........D20(17)23
Z Vul.........D20(18)23
Y Psc.........D20(22)27
del Lib.....D20(24)21L
X Tri..........L20(20)22
Z Per..........22(27)28D
TX UMa...22(27)23L
RW Tau......L22(19)24
2008 Aug 21 Thu
SW Cyg.....00(06)04D
AI Dra..........00(02)03
TX UMa.L02(03)04D
TV Cas......D20(22)26
X Tri..........L20(19)21

2008 Aug 22 Fri
Z Dra..........D20(19)21
TW Dra......D20(19)24
U CrB......D20(26)25L
X Tri...........L20(18)21
Z Vul..........23(29)28D
2008 Aug 23 Sat
S Equ..........D20(17)22
TV Cas.......D20(17)22
U Sge...........21(26)28L
RS CVn.......21(28)23L
Z Per...........23(28)28D
2008 Aug 24 Sun
Z Dra..........01(03)04D
TX UMa..L02(04)04D
Y Psc..........D20(17)21
U Cep.........D20(23)27
V367Cyg.D20(59)28D
2008 Aug 25 Mon
Z Vul...........D20(16)21
del Lib......D20(16)21L
SW Cyg......D20(20)26
AI Dra........D20(21)22
V367Cyg.D20(35)28D
2008 Aug 26 Tue
RW Tau.......03(08)04D
V367Cyg.D20(11)28D
Z Dra..........D20(20)23
S Equ...........22(27)28L
2008 Aug 27 Wed
AI Dra...........00(02)03
Z Per...........01(05)04D
TX UMa..L02(06)04D
V367Cyg.D20(<<)28D
del Lib......D20(23)21L
Z Vul...........21(26)28D
2008 Aug 28 Thu
Z Dra..........02(05)04D
RS CVn....D20(23)23L
RW Tau....L22(26)28D
TV Cas.......24(28)28D
2008 Aug 29 Fri
U Cep.........D20(22)27
U CrB......D20(23)25L
2008 Aug 30 Sat
Z Per...........02(07)04D
TX UMa....03(07)04D
SW Cyg......04(10)04D
U Sge..........D20(21)26
Z Dra..........D20(22)24
TV Cas.......D20(23)28

2008 Aug 31 Sun
TW Dra.....00(05)04D
AI Dra.......D20(21)22
RW Tau......L22(21)26

September

2008 Sep 1 Mon
Y Psc.........01(06)04D
del Lib.....D20(15)20L
TV Cas......D20(19)23
Z Vul.......D20(24)28L
2008 Sep 2 Tue
AI Dra..........00(01)03
Z Per..........03(08)04D
RS CVn...D20(18)23L
S Equ......D20(24)27L
TW Dra..D20(25)28D
2008 Sep 3 Wed
U Sge.........00(06)03L
U Cep.......D20(22)27
del Lib.....D20(23)20L
SW Cyg..D20(24)28D
Z Dra...........21(24)26
2008 Sep 4 Thu
Y Psc......D20(24)28D
2008 Sep 5 Fri
TW Dra.....D20(20)25
U CrB.....D20(21)24L
HU Tau......L23(19)23
2008 Sep 6 Sat
U Sge.........D20(15)21
AI Dra.......D20(21)22
Z Vul.......D20(22)27L
2008 Sep 7 Sun
TV Cas......01(05)04D
HU Tau......L23(21)25
Z Dra............23(25)28
2008 Sep 8 Mon
AI Dra..........00(01)03
X Tri.........04(07)04D
del Lib.....D19(15)20L
TW Dra.....D19(15)20
Y Psc.........D19(18)23
U Cep.......D19(22)26
TV Cas......21(25)28D
RW Tau.....24(28)28D
2008 Sep 9 Tue
X Tri.........03(06)04D
S Equ.........D19(21)27
U Sge......D19(24)27L
HU Tau......L23(22)26

2008 Sep 10 Wed

X Tri..........03(05)04D
Z Dra.........D19(19)21
TV Cas.......D19(20)25
del Lib.....D19(23)20L

2008 Sep 11 Thu

X Tri..........02(05)04D
Z Vul..........D19(20)25
RW Tau.......L21(23)27
HU Tau.......L22(24)27

2008 Sep 12 Fri

Z Dra.........01(03)04D
X Tri..........01(04)04D
TV Cas.......D19(16)20
U CrB......D19(19)24L
AI Dra........D19(20)22
V367Cyg.D19(49)28D
SW Cyg......21(27)28D

2008 Sep 13 Sat

X Tri..........01(03)04D
S Equ..........02(08)03L
U Cep........D19(21)26
V367Cyg.D19(25)28D
HU Tau....L22(25)28D
AI Dra...........24(25)26

2008 Sep 14 Sun

X Tri..........00(03)04D
TW Dra......01(06)04D
Z Vul..........02(07)03L
V367Cyg.D19(01)28D
TX UMa....D19(15)20
Z Dra.........D19(20)23
RW Tau.......L21(17)22
X Tri............23(26)28

2008 Sep 15 Mon

V367 Cyg..D19(<<)22
del Lib.....D19(14)19L
HU Tau......22(26)28D
X Tri............23(25)28

2008 Sep 16 Tue

Z Dra.........03(05)04D
Y Psc.........03(07)04D
TV Cas......03(07)04D
U Cep........04(09)04D
Z Vul.........D19(18)23
S Equ.........D19(18)24
U Sge.........D19(18)24
TW Dra.....20(26)29D
RS CVn......21(27)22L
X Tri...........22(24)27

2008 Sep 17 Wed

Z Per..........D19(15)20
TX UMa...D19(17)21
SW Cyg.....D19(17)23
del Lib.....D19(22)19L
X Tri...........21(24)26
TV Cas......22(27)29D
HU Tau.....24(28)29D

2008 Sep 18 Thu

AI Dra.......D19(20)22
U Cep........D19(21)26
Z Dra...........20(22)25
X Tri...........21(23)26
Z Vul..........23(29)27L

2008 Sep 19 Fri

U CrB........D19(16)22
TW Dra.....D19(21)26
TV Cas......D19(22)26
X Tri...........20(22)25
Y Psc.........21(26)29D
U Sge..........22(28)26L
S Equ..........23(29)26L
AI Dra..........24(25)26

2008 Sep 20 Sat

HU Tau.....01(05)05D
RW Tau.....01(06)05D
Z Dra.........04(07)05D
Z Per..........D19(16)21
TX UMa.D19(18)21L
X Tri...........19(22)24

2008 Sep 21 Sun

U Cep........04(09)05D
SS Cet........04(09)05D
AI Dra.......04(06)05D
Z Vul..........D19(16)21
TV Cas......D19(18)22
X Tri..........D19(21)24
RS CVn...D19(22)21L

2008 Sep 22 Mon

SW Cyg.....01(07)05D
HU Tau......02(06)05D
RS CVn...L04(<<)05D
TW Dra.....D19(16)21
X Tri..........D19(20)23
RW Tau...L20(24)29D
U CrB.........21(27)23L
Z Dra...........21(24)26

2008 Sep 23 Tue

S Equ.........D19(15)21
Z Per..........D19(18)22
TX UMa.D19(20)21L
X Tri..........D19(20)22
Y Psc.........D19(20)24
U Cep........D19(21)25
Z Vul..........21(27)26L
TX UMa....L24(20)24

2008 Sep 24 Wed

SS Cet........04(08)05D
HU Tau......04(08)05D
X Tri..........D19(19)22
AI Dra..........19(20)21

2008 Sep 25 Thu

TV Cas......04(09)05D
Z Dra.........D19(17)19
X Tri..........D19(18)21
RW Tau......L20(19)24
AI Dra..........24(25)26

2008 Sep 26 Fri

U Cep........04(09)05D
Z Vul..........D19(13)19
U CrB........D19(14)20
RS CVn...D19(18)21L
X Tri..........D19(18)20
Z Per..........D19(19)24
SW Cyg.....D19(20)26
TX UMa.D19(21)21L
U Sge.......D19(22)25L
S Equ..........20(26)26L
Z Dra............23(26)28
TX UMa....L24(21)26
TV Cas......24(28)29D

2008 Sep 27 Sat

SS Cet........03(08)05D
AI Dra.......04(06)05D
Y Psc.........D19(14)19
X Tri..........D19(17)19

2008 Sep 28 Sun

TW Dra.....02(07)05D
X Tri..........D19(16)19
U Cep........D19(20)25
Z Vul..........19(24)26L
TV Cas.........19(24)28

2008 Sep 29 Mon

Z Dra.........D19(19)21
Z Per..........D19(20)25
TX UMa.D19(23)21L
U CrB.........19(25)23L
TX UMa....L23(23)27

2008 Sep 30 Tue

U Sge..........01(07)01L
SS Cet........02(07)05D
TV Cas......D19(19)23
AI Dra..........19(20)21

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The **deadline for contributions** to the next issue of VSSC (number 136) will be 7th August, 2008. All articles should be sent to the editor (details are given on the back of this issue)

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