



# The 88<sup>th</sup> Spring Meeting of the AAVSO

University of Toronto, Canada

July 3, 1999

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|--------------------|---|
| 9:00 am - 11:45 am | <b>AAVSO Membership Meeting,</b><br>Medical Sciences Building                         |
| 11:45 am           | <b>AAVSO Group Photo</b>  |
| 12:00 pm - 1:00 pm | <b>Lunch Break</b>  |
| 1:00 pm - 4:00 pm  | <b>AAVSO Paper Session,</b><br>Medical Sciences Building                              |
| 4:15 pm - 6:00 pm  | <b>Ruth Northcott Keynote Lecture: featuring Dr. Geoff Marcy,</b><br>Convocation Hall |
| 7:00 pm - 10:00 pm | <b>AAVSO/ASP/RASC Awards Banquet,</b><br>Westmore Hall                                |

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## AAVSO Paper Session Schedule and Abstracts

**1:00 pm**      **"Examining Prediction Elements for 23 Southern RR Lyrae Stars"**  
Marvin Baldwin

During the past four years some 6,000 visual observations have been made for 23 RR Lyrae stars of southern declination. Reduction of these data has provided information sufficient to confirm the established maxima prediction elements in some cases and provide for revision of the elements in others. Possibilities for establishing the periods of two stars with previously unknown periods is examined.

**1:20 pm**      **"Photometric and Polarimetric Observations of VV Cephei"**  
Hideo Sato, Keiichi Saijo, and Kazuo Yoshiok

VV Cephei is a long-period binary system consisting of an M-type supergiant and a Be star. An eclipse of VV Cephei recently occurred between late 1996 and early 1999. We started photometric and polarimetric observations to investigate the circumstellar dust behavior of this system using a 36-inch reflector. We will report our observational results obtained during the eclipse's ingress and totality.

**1:40 pm**      **"Is RX Cep a Variable Star?"**  
Richard W. Schmude, Jr.

Since 1994, I have estimated the magnitude of RX Cep 282 times using a pair of binoculars. One objective of this study has been to determine if RX Cep is a variable star and if so determine its period of variability. The coordinates and other information for RX Cep and the two comparison stars used in this study are listed in the table below.

| Star   | Right Ascension<br>(2000)                        | Declination<br>(2000) | Spectral Type | Magnitude | B-V |
|--------|--|-----------------------|---------------|-----------|-----|
| RX Cep | 0 <sup>h</sup> 50 <sup>m</sup> 04.5 <sup>s</sup> | +81° 58' 02"          | G5            | ~7.5      | ?   |
| HD7340 | 1 <sup>h</sup> 18 <sup>m</sup> 11.2 <sup>s</sup> | +81° 33' 38"          | G5            | 7.7       | 1.4 |
| HD9653 | 1 <sup>h</sup> 40 <sup>m</sup> 31.8 <sup>s</sup> | +81° 25' 47"          | A0            | 7.1       | 0.3 |

Between JD 2449950 (August 1995) and JD 2450167 (March 1996) 94 magnitude estimates of RX Cep were made and these data were plotted magnitude versus time. There is no evidence for a 55-day period, however, if the amplitude were smaller than 0.1 magnitude, it would not show up on the graph. There is some evidence for a longer period. The average magnitudes for 20-day intervals were computed and plotted magnitude versus date. There is evidence for an ~0.2-magnitude amplitude with a period of 338±12 days, however, atmospheric extinction may have played some role in the results. It is concluded that if RX Cep is a variable, its amplitude is less than 0.3 magnitude.

**2:00 - 2:15 pm Poster Paper Introductions:** Each author present will have the opportunity to give a brief introduction to his or her poster.

**"Nova Velorum 1999 from South America" - poster**  
**Jaime Rubén García**

Last May 22, we had a very unusual sighting in the southern skies, the explosion of a very bright nova in the constellation of Vela, not so far from the popular unique object  $\eta$  Carinae and also close to the Southern Cross. The nova, named V382 Vel, reached visual magnitude 2.8 on May 22, making it the brightest southern nova since Nova Puppis 1942.

Southern Hemisphere observers quickly detected the rapid increase in brightness. The Variable Star Section of the Latin American Astronomical League (LIADA) and REA from Brazil started a campaign which covered the last 10 days of May and the month of June. The campaign was able to cover the entire development of the change in brightness.

I would like to show the results of the campaign, including a light curve and some photographs taken during the first three days of the event.

**"Peak SN Luminosities and Cosmological Distance Determinations" - poster**  
**Diego Rodriguez**

It is well known that SN light curves are useful to obtain distances to galaxies beyond the limit of Cepheid variables. In this paper we present work done by the M1 group of amateur SN observers during the year 1998, which we think will be interesting for this purpose.

We are aware of the need to obtain measurements of the SN as close as possible to the moment of maximum brightness. Still, we find that the values of absolute magnitude inferred from our measurements, and from the accepted distances to parent galaxies, differ significantly from theoretical predictions in a number of cases. Thus SN 1998S, if its distance is obtained from the reported red shift  $z$  of the host galaxy and the common value of Hubble's constant, would be brighter than the accepted limit for a type Ia SN.

We have tried to fit the data to the standard theoretical magnitude by using the value of  $H_0$  that best leads to agreement in most cases. Even so, there are discrepancies that might support the view that type Ia SN luminosities can differ by more than one magnitude.

**"Results of AAVSO PEP Observations of RS CVn Stars" - poster**  
**Devi Soondarsingh\* and John Percy**

RS CVn stars are spotted, sun-like stars which vary because of the rotation of their spotted surface. There are three RS CVn stars in the AAVSO PEP Program - Lambda And, HK Lac, and SZ Psc - and these stars have been observed over many years.

We present the results of these observations, including the period and period change (which depend on the rotation period, and the longitudinal migration of the spots), and the amplitude, shape, and mean magnitude of the light curve (which depend on the number and distribution of the spots). These change from season to season, and the AAVSO PEP observations are useful for studying these long-term changes.

\*participant in the University of Toronto Mentorship Program.

**"Amplitude Changes in Semiregular Variables" - poster**  
**Raymond R. Thompson**

Previous research into the last 100 years of the SRb star U Delphini revealed an increase in amplitude of 2 1/2-fold during the 1940's. The AAVSO web site was used to view the light curves of 130 SR stars from the catalogue to see if similar behaviour could be found in other stars of this type. Four possibilities were found: T Psc, R Scl, S Aur, and BQ Ori. Evaluated data were not available from HQ for three of these stars. Only R Scl was obtainable. This shows a decrease in amplitude of about 50% between 1950 and 1970. Reference to AAVSO Monograph #3 also shows that the RV Tau star R Scuti undergoes periods of reduced amplitude, though on a much shorter time-scale.

An attempt was made to find an explanation for this. It was rendered difficult by the fact that the author is a retired music teacher not an astrophysicist. The articles and papers that were found on this and closely related topics were mostly of a highly technical nature. But a few facts did emerge from the research. First, it seems apparent that the cause of changes in amplitude of variable stars is not known for sure. Second, pulsating stars are subject to so many influences that the physical mechanism is not fully understood. Some of the possible contributing factors are: non-linear dynamics (chaotic behaviour); acoustic shock waves; dust particles, especially in circumstellar shells; opacity in stellar photospheres; and pulsation in a variety of different modes. It was also discovered that long period amplitude changes have been observed in Mira stars; namely, R Tri, R Aur, R Cam, T Cas, U Per, S UMa, and R Vir.

Hopefully it will be possible, at some time in the future, to look at the evaluated data for T Psc, S Aur, and BQ Ori.

**"A Suggested Search for Partial Eclipses in the Nearby Binary Star Gliese 793.1" - poster**  
**Frederick R. West**

Osborn and Hershey (1999) have recently published orbital elements and their astrometric parameters found from spectroscopy and HIPPARCOS astrometry for the nearby two-line spectroscopic binary (SB2) star HD 195987 (Gliese 793.1), and have also recommended a more complete study of this binary star.

The two solar-type stars of Gliese 793.1 have a 57.324 day period of revolution and a 48,000,000 km mean separation in a fairly eccentric ( $e=0.306$ ) orbit whose plane almost contains our line of sight to the star (its orbital plane has the inclination  $i=89^{\circ}5 \pm 8^{\circ}4$  to the plane of the sky). The component stars A and B have estimated radii of 615,000 km and 560,000 km, respectively. The minimum projected separation of their centers on the plane of the sky found from the above orbital elements is about 420,000 km, which indicates that partial eclipses of the stars may occur, since this separation is less than the radius of either star. The intervals of Julian dates when possible eclipses seem most likely from the orbital elements are predicted for the last half of 1999, 2000, and 2002. The detection of such eclipses and precise photometry of their light curves could improve the accuracy of the orbital elements of Gliese 793.1 and could give better values for the radii and photospheric temperatures of its components A and B.

More precise photometry could also be done on Gliese 793.1 to try to detect transits of its component stars by extrasolar planets orbiting them using the matched filter method suggested by Jenkins, Doyle, and Cullers (1996) for detecting transits of the stars of Gliese 630.1A (CM Draconis) by planets orbiting them.

2:15 - 3:00 pm      **Coffee Break and Poster Viewing**

3:00 pm            **"Automated Photometric Reduction of Wide-Field Variable Star Data"**  
                     **Glenn Gombert**

Today's variable star observers equipped with a simple CCD camera, telephoto lens, and "barn door" tracker mount have at their disposal a very powerful set of tools for new variable star discovery. This simple equipment, when combined with software that professional astronomers routinely use (that is readily available for download from the World Wide Web), provides amateurs with powerful new tools for variable star discovery and also for observation of existing variables that have been in the AAVSO's visual program for many years.

The focus of this presentation will be to introduce amateurs to some of the software tools that are readily available to them when combined with simple CCD imaging equipment as mentioned above. Results from several different surveys (using similar equipment as mentioned above) will be discussed. Two such surveys are the "All Sky Automated Survey" at:

<http://www.astrouw.edu.pl/~gp/asas/asas.html>

And "The Amateur Sky Survey" (using the current generation of Mark III Cameras) at:

<http://www.tass-survey.org>

3:20 pm            **"Studies of Yellow Supergiant Variable Stars"**  
                     **Jonathan Hoss\*, David Kolin\*, Liz Nelson\*, and John Percy**

We have studied the long-term behaviour of three different types of yellow supergiant variable stars - population I (classical) Cepheids, population II Cepheids (or W Virginis stars), and SRd variable stars, using a combination of archival data from the literature, AAVSO visual observations where available, and Hipparcos epoch photometry. (1) We have detected the first examples of random, cycle-to-cycle period fluctuations in (long-period) population I Cepheids; (2) We have studied the long-term period changes in two population II Cepheids; we note the lack of long-term monitoring of these stars, and urge the AAVSO to monitor them systematically; (3) We have studied the long-term period and light-curve variations in a small number of SRd stars.

\*participant in the University of Toronto Mentorship Program

3:40 pm            **"Tombaugh's Star: A Historical Summary of the Cataclysmic Variable TV Corvi"**  
                     **David H. Levy**

While doing research for my 1991 biography of Clyde Tombaugh, discoverer of Pluto, I found evidence that he had discovered a probable nova in Corvus. Since this was an unusually high galactic latitude for a nova, I tried to find confirming evidence for his 1931 observation. Although my results were negative for 1931, I did find nine additional outbursts in my search through several hundred Harvard patrol plates. I observed the variable, now called TV Corvi, in outburst for the first time visually on March 23, 1990, and several times since then.