ABSTRACTS OF PAPERS PRESENTED AT THE SPRING MEETING OF THE AAVSO IN AMES, IOWA MAY 25 - 26, 1984

RADIAL VELOCITIES OF NORTHERN HEMISPHERE MIRAS

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Abstract

Radial velocities of absorption- and emission-line systems have been determined for 22 northern hemisphere Mira variables. These were measured from approximately 65 spectra obtained on sensitized IIa-O plates at a dispersion of 12 A/mm (D12). This work was done with the 1.88-m telescope at the David Dunlap Observatory between November 1980 and April 1983. Most of the stars were observed close to maximum light, and so only in a few cases (e.g., R Trianguli) is there any useful phase information available. Two main conclusions from these data stand out:

1. Velocity-phase changes in the absorption-line systems of the northern hemisphere variable R Tri suggest the presence of two simultaneous shocks in the atmosphere close to maximum light (cf. Hill and Willson 1979). This presence is indicated because the subordinate and ionic line forming layers have the velocities that would be expected if they were on opposite sides of a shock wave from the layer where the resonance lines originate.

2. Spectra of the early type variable RT Cygni show changes in line shape and width which can be interpreted as being due to the influence of the shock wave. Since the lines affected are slightly narrower before maximum light, it is suggested that the escape-enhancement process of Mihalas, Kunasz, and Hummer (1976) may be responsible.

REFERENCES

Hill, S. J. and L. A. Willson. 1979, Astrophys. Journ. 228, 854.

Mihalas, D., P. B. Kunasz, and D. G. Hummer. 1976, Astrophys. Journ. 203, 647.

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STRATEGIC VARIABLE STAR OBSERVING

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Abstract

An attempt is made to make variable star observing more efficient, without over-organizing observing to the point where amateurs become too "scheduled" in their volunteer-type activity. The goal is to provide a more continuous, better quality data flow to the AAVSO.

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THE APPLICATION OF VISUAL OBSERVATIONS TO THE STUDY OF A SMALL-AMPLITUDE VARIABLE STAR: RHO CASSIOPEIAE

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Abstract

ρ Cassiopeiae is a luminous yellow supergiant (F8Iap). In 1945-1947, it showed R Coronae Borealis-like behaviour by fading by more than a magnitude for 660 days. It also varies by about $0^m.2$ on a time scale of about a year. Over the years, visual observations of Cas have been extensive and continuous, thanks to the American Association of Variable Star Observers (AAVSO) and the British Astronomical Association (BAA). Photoelectric observations, however, have been sporadic. Since thirty-day means of the visual observations have formal standard errors of only $0^m.02$ (similar to photoelectric observations), we set out to investigate whether the visual observations were free of systematic errors, and whether they could be used to delineate the small-amplitude variations.

We have found that the three data sets - AAVSO means, BAA means, and photoelectric observations - show systematic differences of about $0^m.2$, presumably due to zero-point errors in the comparison sequences and to the difference between the colour sensitivity of the eye and the standard colour sensitivity of the photoelectric **V** filter. To first order, these effects can both be removed by applying a constant correction to the visual observations. We have also looked for any systematic effects in the visual observations with a period of exactly one year. Such effects might occur because of atmospheric extinction, or other aspects of the visual technique. We have found no significant effects of this type.

We have calculated the power spectrum of the AAVSO means and the BAA means and, although both spectra are noisy, they contain mildly significant (P = 0.90) peaks at a period of 275±25 days; a period of about 400 days may also be present. A period of about 300 days, together with the known luminosity of ρ Cas (from its suspected membership in the Cas OB5 association), satisfy the Cepheid period-luminosity relation. This, together with the location of ρ Cas on the H-R diagram, suggests that ρ Cas is closely related to the Cepheid variables.

We thank the AAVSO observers for making the observations, the AAVSO Headquarters staff for processing them and sending them to us, and the Natural Sciences and Engineering Council of Canada for supporting our research.

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THE OPTICAL BEHAVIOR OF SS CYGNI FOR THE INTERNATIONAL CAMPAIGN

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Abstract

An ongoing international campaign has been scheduled to observe the brightest dwarf nova, SS Cygni, in the optical, x-ray, far ultraviolet, and ultraviolet wavelengths during its outbursts. SS Cygni brightens from $11^{m}.8$ to about $8^{m}.3$ during outburst. Ground-based telescopes and EXOSAT, Voyager, and IUE satellites will be used to gather the data. The purpose of the campaign is two-fold: to find out how and where the instability develops in the disk surrounding the white dwarf component of the system at the onset of an outburst, and to search for superhumps - the small-amplitude ($0^{m}.2$ to $0^{m}.3$) modulations with periods 2 to 3% longer than the orbital period of the system. Superhumps have been observed only in SU UMa-type dwarf novae so far.

In order to predict the dates of the outbursts of SS Cygni, recent AAVSO data have been studied. There have been 30 outbursts between 1980 and 1984. The mean interval between these outbursts is 47.83 ± 10.64 days. The outbursts between 1980 and 1982 have been more frequent, at a mean interval of 42.38 ± 5.96 days. Following a quiescence of 85 days, the interval between outbursts lengthened to 47.50 ± 6.22 days in 1982 and to 54.86 ± 4.41 days in 1983.

The AAVSO is a part of and plays a crucial role in this campaign in its informing the astronomers of the onset of the outbursts and in providing optical data. Therefore, observers are requested to monitor SS Cygni closely and to notify Headquarters when this variable is $11^{m}.0$ or brighter. Astronomers will then be alerted so that observations may be scheduled as soon as possible with EXOSAT, Voyager, and IUE.

In order to search for superhumps during an outburst, photometrists are strongly advised to monitor SS Cygni for as long as possible during a night, ideally longer than the 6 hours and 38 minutes which is the orbital period of SS Cygni.

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EXCELLENCE IN SCIENCE: A CHALLENGE

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Abstract

A brief outline of the school project, "Excellence in Science: A Challenge," is presented. This is a pilot project among elementary, middle, high school, and adult education classes within the St. Joseph, MO, school district of presenting a slide lecture discussion of what is in the night sky, a telescope display, and an extensive literature display to help supplement sections on astronomy/space science as taught in general science, physics, earth science, etc. classes in these respective areas. Experiences with this program have produced two middle school astronomy clubs and a third is on its way. These satellite clubs are now part of the local Midland Empire Astronomy

Club, Inc., which has produced a renewal of interest and activity among the latter club members who are acting like "god-fathers" to the new associates. Observational activities in the fields of variable stars, lunar, planetary, solar, and photometric studies have begun and will be expanded and further encouraged.

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OBSERVATIONS OF DELTA CEPHEI BY 9TH GRADE EARTH SCIENCE STUDENTS

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Abstract

A report is given on an earth science project, a required course for 9th grade students in Ames, IA, community schools. As an experiment in the astronomy unit, students made unaided eye observations of Delta Cephei for a month. They entered their data on a computer, then used the data at the end of the month to create a light curve. Seventy students made more than 700 observations of Delta Cephei in September and October, 1983. When reduced and plotted, their data created a remarkably accurate light curve. This exercise is simple to conduct (with or without a computer) and generates a spirit of competition and interest among students.

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EXPEDITION TO SOUTH AMERICA FOR COMET HALLEY

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Abstract

As chairman of the Astronomical League Steering Committee for 1986 expeditions to South America for viewing and studies of the apparition of Comet Halley, I would like to present the current plans for such expeditions, liaison with other astronomical organizations as well as cooperation with several South American astronomical groups, especially in the countries of Peru, Bolivia, Chile, Brazil, Argentina, and Ecuador.

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