

ABSTRACTS OF PAPERS PRESENTED AT THE
 SPRING MEETING OF THE AAVSO IN TUCSON, ARIZONA
 APRIL 25, 1981

A COMPUTER PROGRAM FOR CONVERTING LOCAL TIME OBSERVATIONS
 OF VARIABLE STARS TO JULIAN DATE AND DECIMAL

KENNETH WILSON
 336 Gateway, Apt. 204
 Pacifica, CA 94944

Abstract

A simple Basic program which takes series of variable star observations in a 12-hour local time base (standard or daylight) and converts them to Julian time (date and decimal) and then prints them out in a form compatible with standard AAVSO report procedure is described. The program is valid for both the 20th and 21st centuries and for all North American time zones.

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SIR WILLIAM HERSCHEL AS A SOLAR OBSERVER

ROBERT B. AMMONS
 DOUGLAS AMMONS
 STEPHANIE AMMONS
 University of Montana
 Missoula, MT 59812

Abstract

A search was conducted through Herschel's published research for reports of his solar observing and related scientific activities. This paper summarizes his highly systematic and interlocking experiments with filters. Herschel tried both liquid and solid filters singly and in combinations, using a wide variety of known chemicals, and even wine. Herschel's reports indicate that he: (1) was not really afraid of eye damage from overheated, cracking filters for some reason, although this must have represented a very considerable danger; (2) was an extremely skilled and accurate observer and recorder of visual phenomena; (3) may very well have observed the sun in the equivalent of broad-band hydrogen light, of course without having any idea just what was happening. Some implications for study of the "psychology of the scientist" are pointed out. (Copies of this paper can be obtained from Robert B. Ammons, Department of Psychology, University of Montana, Missoula, MT 59812, or by ordering Document NAPS-03859 from Microfiche Publications, P. O. Box 3513, Grand Central Station, New York, NY 10017, remitting \$3.00 for microfiche or \$8.50 for photocopy.)

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THE 1978 ECLIPSE OF R AQUARIII*

LEE ANNE WILLSON
Iowa State University
Ames, IA 50011

PETER GARNAVICH
Massachusetts Institute of Technology
Cambridge, MA 02139

JANET AKYÜZ MATTEI
AAVSO
Cambridge, MA 02138

Abstract

Decreases in the magnitude of R Aqr at maximum light in 1934 and 1978, as well as a decrease in the magnitude at minimum in 1978, can be interpreted as due to an eclipse of the Mira component by an accretion disk or cloud around the secondary. Earlier eclipses in 1890 and 1846 are also consistent with the light curve (which has been published by Mattei and Allen, 1979, JRASC 73, 173). The irregularly spaced brightening of minima, which was particularly pronounced during the 1930's, can then be attributed to instabilities in the accretion process onto the secondary. The orbital period of 44 years is roughly 42.5 times the pulsation period of the Mira component; this has meant that every other eclipse occurred with R Aqr near the sun at maximum, and has thus contributed to the long delay in recognition of this system as an eclipsing system.

*Condensed from Information Bull. Variable Stars. No. 1961.

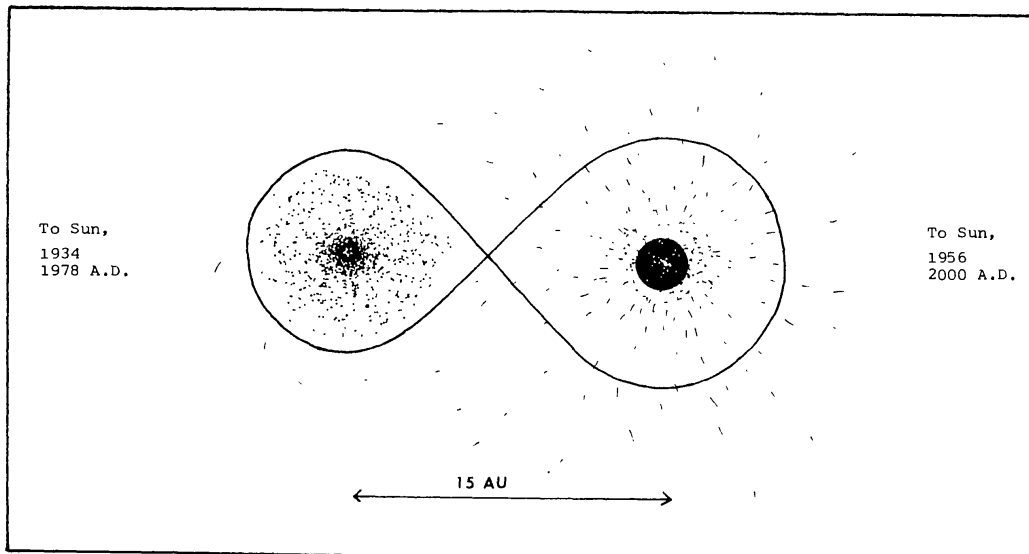


Figure 1. The R Aquarii system is sketched as it might appear viewed from a point above the orbital plane. The red giant component is a Mira with a strong stellar wind; some of the material it is shedding is attracted by its companion, a white dwarf, forming a thick accretion disk or cloud around the secondary. For typical white dwarf and Mira masses the orbital period of 44 years suggests a separation of about 15 astronomical units.

TIME SERIES INFRARED SPECTROSCOPY OF α CETI

KENNETH H. HINKLE
Kitt Peak National Observatory
Tucson, AZ 85726

Abstract

A time series of 16 high-resolution infrared spectra of α Ceti has been analyzed. Thirteen of the spectra are of the 1.6 to 2.5 μ m region. Three spectra are of a narrow region at 4.6 μ m. Using information derived from the CO $\Delta v = 1, 2,$ and 3 vibration-rotation bands, we show that α Ceti is characterized by a regularly pulsating photosphere and a complex circumstellar envelope. The atmospheric structure and dynamics of this star closely resemble those previously observed in χ Cygni and R Leonis. The photospheric velocity curves of these three Miras all have amplitudes greater than 20 km s⁻¹. Photospheric velocities measured in α Ceti at 2 μ m range from +45 to +68 km s⁻¹. This is in marked contrast with the velocity behavior seen in the visual. Multiple velocity components originating in extended photospheric and circumstellar regions can also be seen at 2.3 and 4.6 μ m.

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SOLAR CYCLES AND TREE RINGS: EOCENE TO PRESENT

RICHARD AMMONS
ROBERT B. AMMONS
University of Montana
Missoula, MT 59812

AILSA AMMONS
Helgate High School
Missoula, MT 59801

Abstract

We have extended A. E. Douglass' research on quasi-cycles in petrified wood, studying hundreds of samples from Wyoming, Washington, and Oregon, 15 to 50 million years in age, and adding the best to our collection for further research. With present samples we note possible changes in commonly-found quasi-cycle periods of about 5 to 25 years in duration, using standard methods of spectral analysis. Several difficulties of this research are discussed, including that of detecting quasi-cycles. We are primarily interested in the question: assuming that the commonly-found quasi-cycles are solar-related, how do characteristics of solar variations change through geologic time? Three exceptionally good ring records and corresponding spectra are discussed in detail, especially with regard to appearances and sometimes disappearances of quasi-cycles with periods of approximately 7, 11, 13, 15, and 22 years in the samples, two of which are from Washington (Miocene) and one from Wyoming (Eocene). (Copies of this paper can be obtained from Robert B. Ammons, Department of Psychology, University of Montana, Missoula, MT 59812, or by ordering Document NAPS-03859 from Microfiche Publications, P. O. Box 3513, Grand Central Station, New York, NY 10017, remitting \$3.00 for microfiche or \$8.50 for photocopy.)

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RECENT PHOTOMETRY OF SEVERAL RS CVN STARS

GREGORY W. HENRY
Vanderbilt University
Nashville, TN 37217

Abstract

There is increasing evidence from many regions of the electromagnetic spectrum for the existence of chromospheric activity and

spots on stars other than our sun. In particular, the RS CVn binaries have recently been intensively studied in an attempt to understand this activity. A large spot or spot group on one hemisphere of a rotating RS CVn star will result in a distortion wave in the light curve of the star as an observer on the earth alternately sees the spotted and unspotted hemispheres. Photoelectric photometry of these stars reveals much about the behavior of these star spots. Recent results of photometry of several RS CVn binaries will be presented.

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AN INTERACTIVE BINARY MODEL FOR ERUPTIVE SYMBIOTIC SYSTEMS

LEE ANNE WILLSON
Iowa State University
Ames, IA 50011

Abstract

Symbiotic stars, also known as Z Andromedae variables, include a variety of strange objects which show simultaneous evidence for low-temperature and high-temperature gas. Many of the known symbiotic systems are eruptive, with one or more nova-like eruptions occurring in a few decades to a century of observations. A theory which accounts for the properties of at least some of these systems assumes that a Mira star with a strong stellar wind has a white dwarf companion. The white dwarf accretes material from the cool stellar wind until it becomes unstable to nuclear reactions; the eruption occurs when the white dwarf ejects its envelope in a high-speed, high-temperature wind.

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HOMEBUILT DIFFERENTIAL PEP FOR A CELESTRON-8

JEFFREY L. HOPKINS
7812 W. Clayton Drive
Phoenix, AZ 85033

Abstract

This paper describes a differential photoelectric photometer (PEP) system using a Celestron-8 telescope and homebuilt PEP equipment.

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PERCEPTUAL EXPERIENCES IN SOLAR OBSERVING

DOUGLAS AMMONS
ROBERT B. AMMONS
University of Montana
Missoula, MT 59812

Abstract

Perceptual learning as a phenomenon in solar observing is discussed, with special reference to the effect of experience on an observer's discrimination of details, and how characteristics of perceptual responses transfer to other perceptions in complex, unforeseen ways. Personal illustrations are given of effects on observers' perceptions clearly caused by specific, intensive observational experiences. The authors point out that the investigator must study not only changes in the objective subject matter, but also learning-induced changes in his own perceptions. (Copies of this paper can be obtained from Robert B. Ammons, Department of Psychology, University of Montana, Missoula, MT 59812, or by ordering Document NAPS-03859 from microfiche Publications, P. O. Box 3513, Grand Central Station, New York, NY 10017, remitting \$3.00 for microfiche or \$8.50 for photocopy.)

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HENRIETTA HILL SWOPE, 1902-1980
ASTRONOMER, EDUCATOR, BENEFACTOR

BARBARA L. WELTHER
Center for Astrophysics
Cambridge, MA 02138

Abstract

This paper will review Miss Swope's work on variable stars with Harlow Shapley at Harvard and with Walter Baade at Mt. Wilson Observatory. It will also note her gifts to the Las Campanas Observatory in Chile and to her alma mater, Barnard College, where she taught astronomy.

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REAL-TIME MONITORING OF SOLAR ACTIVITY:
THE NOAA SPACE ENVIRONMENT LABORATORY

WILLIAM R. WINKLER
NOAA National Geophysical and Solar-Terrestrial Data Center
Boulder, CO 80302

Abstract

The operations of the National Oceanic and Atmospheric Administration's Space Environment Laboratory in Boulder, CO, will be described. The SEL operates its own solar observatory and is in constant communication with a network of others around the world. The work of SEL is of wide general interest, and this talk will provide Solar Division observers with a useful perspective on its services.

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DETECTING BRIGHTNESS VARIATIONS DUE TO
SUN-SPOT CYCLES IN NORMAL STARS

RONALD D. FERDIE
7630 E. Linden Street
Tucson, AZ 85715

Abstract

Many recent studies indicate that major climatic changes on earth appear to be linked to solar activity cycles, as well as orbit variations, precession, volcanic dust, etc. The problems in detecting solar cycle brightness variations in similar stars are primarily twofold: 1) detection is near the threshold of best reduced photoelectric measurements (Δ_m from .002 to .01 mag.); and 2) prolonged study over a period of years is required. It is proposed that a selected number of comparison stars already in use be monitored more carefully.

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THE ORION VARIABLES: A SYMPHONY OF DELICACY AND BRILLIANCE

DAVID H. LEVY
Route 7 Box 414
Tucson, AZ 85706

Abstract

When observed carelessly, the variable stars in the Orion Nebula offer the questionable satisfaction of that of listening to a rehearsal of musicians who are untrained and whose instruments are out of tune. But if these variables are watched with care and precision, the celestial orchestra becomes a joy to observe and a challenge to record. Light curves of two or the more active variables, NV and AI Orionis, are offered to support this contention. This paper concludes a series that has described five seasons of observing these intriguing stars.

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