A A V S O   A B S T R A C T S

Edited by R. Newton Mayall

PAPERS PRESENTED AT THE 43RD FALL MEETING, OCTOBER 8-9, 1954

The 43rd Fall Meeting of the AAVSO brought its usual good weather to Providence, Rhode Island. Prof. Smiley was not only our gracious host, but he acted as "athletic director" and proved the AAVSO'er can really get around. Friday night our meeting was held on the Brown University Campus in the Planetarium, where Prof. Smiley entertained and enlightened us about hurricanes. He predicted Carol and Edna -- those two perverse maidens that devastated New England just prior to our meeting. He insists he doesn't predict hurricanes, but he is having a lot of fun trying, by research and statistical means. His description of what causes hurricanes, and an account of many in the past, was supplemented by interesting slides.

Saturday morning we met in the Ladd Observatory, a mile or so from the Campus. There we held the usual business meeting and a few papers were read. Also, the Thirteenth Merit Award was presented to Roy Seely, with the following citation: "In recognition of his faithful devotion to the interests of the Association for over thirty years; of his loyal services as President and Secretary; and especially of his untiring efforts in producing new variable star charts." At noon we went back to the Campus to the Refectory, where an excellent lunch was served in the President's Dining Room in pleasant academic surroundings.

At 2:30 we arrived in Scituate, Rhode Island, about 15 miles west of Providence, where we held our session for papers in the Seagrave Observatory, which is located on Peep Toad Road about a mile from the center of town. Here the Skyscrapers, an active group of amateur astronomers, were our host. The Skyscrapers made arrangements for a dinner at the local Episcopal Church -- an exceptionally good dinner being provided by the men of the church.

After dinner, back to Seagrave we went, where Dr. Hoffleit read Dr. Shapley's annual "Highlights of Astronomy," and Prof. Smiley entertained us again with slides taken on his trip to India to observe the eclipse last June. At a late hour we returned to Providence with the knowledge that we'd had a wonderful time and were not so sedate that we couldn't get around -- notwithstanding the fact that so many cars couldn't seem to find their way around Providence (especially the Recorder's!). This was the first fall meeting to be held away from Cambridge, and was a large and enthusiastic gathering.

****

VARIANCE SPECTRA OF VARIABLE STARS, by Leith Holloway

Variance spectra have been computed for two long-period variable stars (T Cep and Z UMa). Here the variation of each star's light is resolved into components at different periods by means of a "statistical spectroscope." Since only 140 ten-day means of T Cep are used, no significant periods other than the fundamental period of 389 days can be detected. The spectrum of Z UMa is based on 300 ten-day means and shows significant peaks at 193 days (the fundamental period), 38 and 25 days. However, the resolution in the spectrum of Z UMa is poor at periods greater than 60 days. A thorough study of the spectra of long-period variable stars by this technique would require over 25 years of AAVSO observations.

A SIMPLE "PROMINENCE TELESCOPE," by Harry L. Bondy

Lyot's ingenious coronagraph has been converted by Dr. Waldmeier (1940), by Mr. Nögel (1952), and by others into a simple prominence telescope for amateur observations. The essential parts of such a telescope are: 1) a good plano-convex objective lens (preferred to an achromat); 2) an occulting disc placed in the focal plane of the objective lens and somewhat larger than the solar disc; 3) the occulting disc is mounted in a simple field lens; 4) then follows an important diaphragm which removes the diffracted light-rings of the objective; 5) a second objective (an achromat) which images the occulting disc and the surrounding prominences in a one-to-one ratio; 6) a narrow band filter or sharp cut-off filter such as a Bausch and Lomb interference filter centered on 656μ or a Kodak Wratten filter #29. Such a filter permits one to see the prominences in the light of the red hydrogen line Hα. The interference filter and the Wratten filter may be combined if the resulting image is still too bright; 7) the eyepiece. Regular prominence observations under good seeing conditions are now being made by amateurs owning such telescopes in Germany. No high altitude conditions are necessary since prominences are more than a hundred times brighter than the corona. Detailed information will be presented in the November 1954 issue of the Solar Division Bulletin.

VARIABLE STARS OF THE BAR OF THE LARGE MAGELLANIC CLOUD
by Virginia McKibben Nail

The percentages of the type of variables found among the giant stars is about the same for both Clouds: about 70% are classical Cepheids, 7 eclipsing, 3 long-period, 1 nova, 10 irregular, 10 have small range and variability is doubtful. The variables in both Clouds do not differ from each other in the slope of light curve, nor do they differ greatly from the Galactic. The striking difference between Galactic, Small and Large Cloud variables is the difference between the distribution of the period length for them. The Small Cloud has many more Cepheids shorter than three days, and the Galaxy has a maxima at about five days, with the Large Cloud maxima frequency around four days. A concentrated study is being carried out under Dr. Shapley on the Bar of the Large Cloud. At the present time we have periods for 318 Cepheids along this region. The next step will be an investigation into the period-luminosity relation for each group, the magnitude sequences used over the entire Bar, the locations of bright and dark material, and the spectral distribution, as far as possible.

SEEING BRIGHT STARS IN THE DAYTIME, by Cyrus F. Fernald

I have tried to see how faint a star I could find in the daytime, under many different conditions. The following are qualitative results, but they will show the trend which is to be expected. The equipment used is my Springfield mounted 8" reflector, of 75" focal length. The eyepieces are 1.25" to 1.5" focal length, giving magnifications of from 50 to 60. Of course it is necessary to have exact focus to see the faintest stars. And as a corollary to that statement, the better the seeing conditions the fainter the stars that can be seen. I find that with fair to good seeing conditions, the half dozen or so stars brighter than the first magnitude can be picked up quite easily. When seeing improves to good or excellent, stars down to 2.2 or even lower can be seen. My prize exhibit is Mizar, magnitude 2.4. When I first found this in broad daylight, I was much surprised to see the 4th magnitude companion. Also, by knowing Alcor's exact position with respect to Mizar, it was also found.

By knowing the exact position of a star with reference to some one or more check stars, a practiced observer can see a full magnitude or more lower than he otherwise would be expected to. As a typical case, on Sept. 12, 1954 at 5:15 p.m. EDT, with the sun at 111805, about an hour above my western horizon, and Mizar at 132155, about two hours in hour angle, and 50° in declination away, both 4th magnitude stars were seen. Another interesting note in my somewhat sketchy records says that on Oct. 21, 1949, at 11:45 a.m. , I found Arcturus when it was approximately the same hour angle as the sun, and about 30° north of it in declination. Following Venus through inferior conjunction is also a fascinating experience.

SOLAR ACTIVITY IN THE FIRST HALF OF 1954, by Harry L. Bondy

Sunspot activity is only one form of the overall solar cycle. The current minimum of solar activity is evidenced by the frequent total absence of sunspots. Faculae, which never disappear completely from the solar disc, occur in the equatorial as well as high latitude regions and polar caps. Flares are totally absent. Prominences occur mostly around 45° lat. Coronal activity is minute and the well-known green emission line is seldom detectable. Radio frequency radiation from the sun is also at minimum. This is best seen in the 10cm radiation. Radio bursts are equally infrequent. Yet while we are going through the minimum (and may have passed it in June), the activity of the forthcoming new solar cycle is already clear.

THE LONG PERIOD VARIABLES IN A FIELD IN SAGITTARIUS
by Dorrit Hoffleit

I have been estimating the magnitudes of variable stars I discovered many years ago in Milky Way Field 193, a rich star field centered at $18^h\ 23^m\ -23^\circ.3$ about 14° from the galactic nucleus. There are some 450 unpublished variables of which more than 300 have now been examined on 30 or more plates.

The region investigated is structurally interesting in that the southern half distinctly represents outlying portions of the galactic nucleus while the northwest corner is overlapped by the Small Sagittarius Cloud which is part of a relatively nearby spiral arm. Our long-period variables are clearly all in the dense regions associated with the galactic center; not one long-period variable has been found in the northwest corner. The variables found there are apparently Cepheids, irregular or eclipsing; one previously published Cepheid appears to be at a distance of 1.3 kiloparsecs. The period-frequency distributions indicate that the constituents of Population II within the central nucleus itself may be somewhat different from the general "halo" of Population II stars that not only permeate the central regions but also extend to the far reaches of the system. Some statistical indication of a period-magnitude relation was hoped for but not found. Irregularities in interstellar absorption combined with the real dispersion in the distances could well mask such a relation in this region.

The Wilson-Merrill period-luminosity relation was adopted for provisional distances. A general absorption in accordance with Bok's observations of colors of B-type stars in neighboring Sagittarius fields was adopted. It is assumed that most of the absorbing material is comparatively nearby in the spiral arms. On this basis an average distance of 6.5 kpc for the 60 variable stars is indicated. If the galactic center is at 8 kpc we appear to be dealing with stars on the near side of the dense central bulge which may have a radius of a kiloparsec or more.

NOVA SAGITTARII 1928, HV 12320, by Jean Hales

While estimating the magnitudes of some 450 variable stars discovered by Dorrit Hoffleit in Milky Way Variable Star Field 193, I discovered one of the variables to be a nova. Maximum brightness 8.9m was observed on a plate taken on June 24, 1928. Two days before, the nova was fainter than 15.6. In all, some 830 plates of the various Harvard series were examined, taken between July 26, 1899 and August 28, 1951. Limiting plate magnitudes were between 12.0 and 16.5. No images of the nova were found prior to June 21,1928 or subsequent to September 8, 1928. On the basis of McLaughlin's classification, this nova is "moderately fast," decreasing by 2½ magnitudes in 26 days in comparison with Nova Lacertae 1910 which declined 2½ magnitudes in 30 days. Nova Mensae 1951 in the Large Cloud was faster, 2½ magnitudes in 6 days. Within the approximately 8° x 10° field covered by the variable star survey of VSF 193, nine novae have previously been discovered. The newly discovered nova may be the fastest in this area.

AN APODIZING SCREEN, by David W. Rosebrugh

My screen is of the triple thickness type as described in the March-April 1954 issue of the Strolling Astronomer (Assn. Lunar and Planetary Observers), and in the June 1954 Scientific American. I used it with my 6" reflector, 144X, when observing Mars. The principle appears to be that the apodizing screen suppresses the diffraction rings so that the planet appears sharp instead of being suffused with light. The screen may be of use on Venus, Jupiter, and double stars with a wide range of magnitudes. It appeared to dim Saturn and obscured the details.

OBSERVATIONS BY THE YARD, by John J. Ruiz

When taking P.E.P. (photoelectric photometer) observations, it is very convenient to have one observer at the telescope doing the guiding and another watching the indicating meter and recording the deflections. Last year my recorder deserted me (to get married) and I substituted an Esterline-Angus recorder. The speed of the chart was stepped up to 30 inches per hour on the advice of Dr. Hall of the Naval Observatory. This has proved very successful and last summer I was able to get about 30 yards of tracings on u Her (171333). The records clearly show all the pitfalls that occur in P.E.P. work. For instance, poor seeing (scintillation) causes the needle to fluctuate, giving a ragged line (radio and radar engineers call this "noise" or "grass"). When the seeing is good, on the other hand, the records show a steady line. Haze will steady the needle, but haze always introduces uncertainties which are fatal for PEP observations, although such nights might be good for double star or planet observations. Nights when the atmosphere is both steady and transparent are very rare, indeed, in the Northeastern states. They can be counted on the fingers of one hand.

The recorder will also give permanent records of such defects as unsteady zero point of the amplifier, loose connections, leakage currents, and just plain cussedness of the whole outfit when it takes a notion to become temperamental.

DF CYGNI, by Margaret Harwood

DF Cygni, an RV Tauri variable, is a star which ought to be followed visually as well as photographically. It is an interesting star for observers who have telescopes of 6" aperture or larger. The position for 1900 is R.A. $19^h 45^m 38^s$ Dec. +42° 47!2. It has a double period of 49ᵈ808 superposed on a long period of about 782 days. It grows redder as it becomes fainter, and the color index is also variable. The photographic range is 10ᵐ8 to 15ᵐ2; the visual range from 10ᵐ2 to 13ᵐ5. I will supply a chart of the region and the visual sequence to anyone who will observe this star.

LIGHT CURVES OF Z ANDROMEDAE, by Margaret W. Mayall

The variable star Z Andromedae was discovered by Mrs. Fleming at Harvard Observatory in 1901 from its peculiar spectrum, which resembled that of Nova Persei 1901 and of Nova (RS) Ophiuchi 1898. Mrs. Fleming recorded it as "bright lines, nova or variable?" When its photographic light variations were studied, it was found to have had a gradual rise, with fluctuations, from 12.5 mag. in 1887 to 11th mag. in 1901, then a rapid increase to 9th mag. at the time of the Harvard Observatory spectrum plate. The star faded, with several intermediate maxima, and remained almost constant at 12th mag. from 1911 to 1914, when another sudden outburst occurred. The star passed through a similar cycle of fluctuations and had a third burst of activity in 1940, when it reached 7.8 m. on the visual scale. At the present time Z And seems to be settling down to about the 11th mag. It is classed as a "nova-like" variable. It has a composite spectrum formed by a hot blue star superimposed on a cooler red star. The semi-periodic outbursts are almost certainly due to the hot blue star. The lines of it almost disappear when at minimum and the titanium oxide bands of the red star are then prominent. The variable becomes definitely bluer as it reaches maximum and redder when at minimum. There is a strong indication of a periodicity in the vicinity of 20 years. The interesting question is, "Will the next three or four years produce another 8th magnitude outburst?"

OBSERVATIONS OF AE AQUARII, 1954, by Francis H. Reynolds

AE Aquarii was first reported as a variable by Wachman in 1931. Mt. Wilson studies of its spectrum at minimum light showed characteristics of SS Cygni-type stars. From the nature of the spectral changes, Dr. Joy concluded that the star was a binary.

Dr. Harold L. Alden of the Leander McCormick Observatory called attention to AE Aqr's rapid variation in brightness. This seems to be the first report in the literature of observations of the extremely rapid variation of this star, and from the range and speed of change seems quite typical, agreeing with recent observations. Since Mrs. Mayall designated July 1952 as "AE Aquarii Month," I have been observing it as frequently as conditions permit. If a typical "flare" of this star is to be observed, it is necessary to make estimates of brightness at very frequent intervals. Since AE Aqr is always "on the move," so to speak, and exhibits many interesting and sometimes startling light changes, I have adopted the practice of making estimates at least every two minutes, and usually every minute, from the time I begin observing. It is very evident that tremendous differences exist between the energy radiated from AE Aqr when in the quiescent phase and that radiated during a flare. In casting about for some means of making this apparent, a paper by Clinton Ford at one of our meetings came to mind. He suggested that pertinent data might be brought to light by integrating the area under the light curve of a variable star. Graphically integrating the area under each curve gives the total area (11.4 mag.was taken as an arbitrary datum line), which can be expressed in terms of what I shall call "magnitude hours." This process in effect reduces the activity intensity to the equivalent of the star's performance, if the activity had continued at the same level for a period of one hour.

TELEVISING AN ECLIPSE, by Roy A. Seely

The publicity committee of the New York Amateur Astronomers Association working through the facilities of the N.B.C.TV made possible the television broadcast of the partial solar eclipse as seen in New York June 30, 1954. A 6" reflector telescope stopped down to 3" aperture projected the image of the sun through a 3/4" ocular onto an Opal Flash glass plate which was 12" from the telescope tube. This projected image was 5¼" diameter. The camera was placed close to the screen but space was allowed for the necessary movement of the telescope.

The initial broadcast was local for 15 minutes preceding the Dave Garroway program "Today" at 7:00 a.m., during which time the solar image was available for use on the screen. The main interest for this period was an interview by Ben Grauer questioning Leo Mattersdorf. From 7 to 8 a.m. flashes were shown from Minneapolis showing totality and from Chicago as well as New York.

****