Cohen, M. H. and Schiffmacher, E. R. Some solar observations with the Cornell narrow-band radio polarimeter.

A correlation-type radio polarimeter has been constructed at the Cornell Radio Observatory. The center frequency is 201.5 mc; bandwidth, 9 kc; antenna, a 17-foot paraboloid with crossed dipoles diplexed to give simultaneous right and left circular components. The instrument has been in partial operation since 15 December 1956, and observations have been made of the sun on both quiet and active days. This instrument has a substantially narrower bandwidth than the polarimeter used by Hatanaka *et al.* (1955), 100 kc at 200 mc, and the polarization measuring interferometer used by Payne-Scott and Little (1951), 150 kc at 97 mc, but to date no significant bandwidth effects have been observed. In particular, many unpolarized bursts have been seen, some of them in time association with small flares. Several outstanding events with polarizations changing rapidly with time have been recorded.

Hatanaka, T., Suzuki, S. and Tsuchiya, A. 1955, *Proc. Japan Acad.* **31**, 81.

Payne-Scott, Ruby and Little, A. G. 1951, *Aust. J. Sci. Res.* **4**, 508.

*School of Electrical Engineering,
Cornell University,
Ithaca, N. Y.*

Deutsch, Armin J. A method for mapping the surfaces of some magnetic stars.

Certain stars are known to be periodic magnetic variables, and to show synchronous changes in line strength and radial velocity. The hypothesis has been made that the atmosphere of such a star is in rigid rotation, and that it is characterized by a permanent magnetic field and associated abundance irregularities. The magnetic potential and the local equivalent widths have been developed in spherical harmonics, and the Laplace coefficients of these expansions have been related to the Fourier coefficients of the observed curves. The theory has been applied to the star HD 125248 in an attempt to verify the original hypothesis and to map the magnetic field and abundance anomalies over the surface of the star.

*Mount Wilson and Palomar Observatories,
Carnegie Institution of Washington,
California Institute of Technology,
Pasadena, Calif.*

de Vaucouleurs, G. A survey of bright galaxies south of -35° declination.

A survey of the bright galaxies listed in the Shapley-Ames Catalogue south of -35° declination has been carried out between 1952 and 1955 with the 30-inch Reynolds reflector of the Australian Commonwealth Observatory, Mount Stromlo. New or revised types and dimensions were determined for 210 of the 230 S-A objects listed, for 120 other NGC and IC objects, and also for 130 uncatalogued objects.

Morphological types were assigned in a revised classification scheme including four main *classes*: ellipticals E, lenticulars So, spirals S and irregulars I; two *families* of lenticulars and spirals: ordinary SA and barred SB, with intermediate objects SAB; two main *varieties* of lenticulars and spirals: ringed r and spiral s, with intermediate objects rs; four or five *stages* along the spiral sequences: early a, intermediate b, late c,d and magellanic m, the latter forming the transition toward the magellanic irregulars Im. Three stages, early So⁻, intermediate So⁰ and late So⁺, are also distinguished in the lenticular sequences. Outer ring-like structures R are frequently observed near the transition stage So/a between lenticulars and spirals (de Vaucouleurs 1957).

Dimensions reduced to standard conditions are given for the bright inner regions and the faint outer regions; statistical data are collected on axial ratio and concentration. Relative distances based on apparent diameters are determined for seven clouds or regions. Relative diameters reduced to unit distance are discussed. Pairs and triplets are classified according to the visibility or non-visibility of tidal distortion in the components. Two colliding systems, NGC 1487 and NGC 3256, are described; neither of them is a radio source.

Details will be published shortly in the *Mem. Commonwealth Observatory*, No. 13, including illustrations of 48 objects.

de Vaucouleurs, G. 1957, *A. J.* **62**, 13.

*Lowell Observatory,
Flagstaff, Arizona.*

DeWitt, John H., Hardie, Robert H. and Seyfert, Carl K. A seeing compensator employing television techniques.

Short time variations in atmospheric refraction cause the apparent position of an object to vary

at random over a range of a few seconds of arc. The use of television techniques permits very short exposures to be made on bright planets and at the same time makes possible a system of continuous position correction which eliminates one destructive effect of seeing.

In the apparatus developed at the Arthur J. Dyer Observatory of Vanderbilt University the 5820 orthicon tube is used as a receiver of the telescope output. The tube's target voltage may be triggered at intervals ranging between $1/30$ and $4/15$ seconds permitting a considerable increase in sensitivity through target storage. Fifth magnitude is easily reached with the 24-inch reflector.

For planetary photography the cassegrain output is enlarged through a negative lens and split with a dichroic mirror to produce two images approximately $\frac{1}{2}$ " in diameter each. One image is fed to the orthicon cathode surface. The second image is fed into two radial slits placed 90° apart at the image periphery. Light passing through the slits is caught on two 1P21 photocells. The current developed in these cells is a linear function of the image position with respect to the slits. Around the image section of the orthicon, deflection coils are placed 90° apart. The photocell output currents are amplified and fed into these deflection coils in such phase as to cancel at the orthicon target the variations of image position with varying atmospheric refraction. These control currents can also be used to operate automatically the telescope's slow motion controls in R.A. and Dec. The method of position compensation appears applicable to other forms of image amplifiers. The apparatus is currently being employed to photograph Jupiter with exposure as short as $1/30$ sec.

The project is sponsored jointly by Vanderbilt University and WSM-Television.

*Dyer Observatory,
Vanderbilt University,
Nashville, Tenn.*

Dodson, Helen W. and Hedeman, E. Ruth.
Flares with major early bursts at frequencies ≤ 200 Mc/s and subsequent geomagnetic disturbances.

Intercomparison of world-wide optical and radio-frequency solar data has shown that during the $7\frac{1}{3}$ year interval between January 1949 and April 1956 only 113 of the approximately 3000 observed flares are known to have had major bursts at frequencies ≤ 200 Mc/s during the pre-

maximum phase of the $H\alpha$ flare. Even though the records are unavoidably incomplete, the major early burst appears to be a relatively rare solar event. During the time interval studied, such bursts occurred in conjunction with flares in all importance categories and at all central meridian distances.

World-wide geomagnetic reports show that 92 per cent of the above 113 flares were followed by onsets of geomagnetic storms in less than five days. The average time interval between the occurrence of flares with major early bursts and the start of storms was $2\frac{1}{2}$ days. Superposed values of the geomagnetic indices (K_p and A_p) show large increases starting two days after the flare, with maximum on the third day. Special studies of all flares of importance 3 and 3+ in the same period showed that the above relationship was maintained when these flares had early major bursts but was not maintained when emission at frequencies ≤ 200 Mc/sec was not present or when such emission occurred only in the post maximum phase of the flare.

The 113 flares with major early bursts were associated with 79 separate geomagnetic storms. For 64 of the storms at least one station reported the sudden commencement phenomenon, and for 41 a majority of the stations classified the storm as sudden commencement. Only 3 of the 79 storms were members of well established 27-day recurrent series.

Studies are now in progress to evaluate the roles of flare importance and position, and phase of solar cycle. More abundant radio data giving polarization and dynamic spectra should further improve the relationships here indicated.

*McMath-Hulbert Observatory,
University of Michigan,
Pontiac, Mich.*

Duncombe, R. L. and Clemence, G. M. On the secular change of the obliquity.

Observations of the sun, moon, and planets (Morgan 1950), of Mercury (Clemence 1943), and of Venus (Duncombe 1956) have indicated that the obliquity of the ecliptic is diminishing faster than Newcomb's theory of the motion permits. The first three lines of Table I show the observed corrections to Newcomb's centennial variation of the obliquity, with probable errors where given by the authors; the discordances are probably attributable to errors in the observations. Only a small portion of the observed corrections can be ascribed to errors in the adopted