morning and afternoon. Night values rise and noonday values lower during the summer months due to increased ionization of the atmosphere accompanying longer days and higher solar altitudes. With the progress of the sunspot cycle a metamorphosis takes place, the winter pattern gives way to a summer pattern which has persisted through 1947 and into 1948. It may be anticipated that with the decline in sunspots from the maximum of 1947 the diurnal field intensity changes during the coming winters will again begin to simulate the double-maximum pattern previously observed at lower values of solar activity such as occurred in 1944 and 1945.

Observations on the broadcast band of Station WBBM, Chicago, 780 Kilocycles, received at Needham, a distance of 851 miles, show a general decline in field intensities from values in excess of 270 microvolts to values of but 45 microvolts as sunspot numbers increased from 20 to a maximum value of 150. In treating the WBBM data, midnight values were taken with 12-month moving averages to eliminate seasonal effects.

In conclusion, it is to be emphasized that while measurements of critical frequencies, as contributed by numerous Ionospheric Stations, yield values of electron densities at the region of maximum ionization in the layers observed, and therefore determine the possibility of reflection of given frequencies over given paths, the measurements of field intensities afford records of actual performance, thus indicating not only conditions at the reflecting layer but the degree of absorption introduced through the lower ionized atmosphere as well.

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Struve, O. Spectrographic observations of short-period Cepheids.

During the summer of 1947 a series of 390 spectrograms of RR Lyrae, whose principal period is 13.6 hours, was obtained at the McDonald Observatory in order to study the effect upon the velocity curve of the long period of 41 days, which is known from the light curve. The spectrograms were measured by Dr. A. Blaauw and the writer. On June 5 and again on July 17 the velocity curve was retarded by 20 minutes—a conspicuous phenomenon for a velocity curve in which a change of 20km/sec takes place in 24 minutes. Approximately half-

way between, on June 26, the velocity curve was advanced by 20 minutes. This shift along the time-axis of the short-period curve agrees exactly with the shift of the light-curve as observed by Walraven at Leiden in 1947.

After the short-period velocity curve was corrected for this oscillation it disclosed only relatively insignificant, though probably real, changes in shape, within the 41-day cycle, when the metallic lines were used. The hydrogen lines, $H\gamma$, $H\delta$ and $H\epsilon$ however, differ in a remarkable manner from the metallic lines. For them the descending branch of the curve is steeper and the range larger than for the metallic lines. The minimum velocity for H is about -115km/sec while for the metals it is about -100km/sec . The higher members of the Balmer series agree with the metallic lines. In the case of $H\gamma$ alone, the minimum velocity is nearly -120km/sec , so that we are concerned with a phenomenon which depends upon the quantum number of the upper state. The maxima are less strikingly different.

The H velocity curves show an interesting connection with the 41-day period: when the velocity curve is most retarded, that is, near June 5 and July 17, the curve rises to a peaked maximum at about -25km/sec . When the velocity curve is most advanced the maximum is about -45km/sec . The peaked curves correspond to the greatest intensity of the sharp H emission lines which are observed at about median decreasing velocity. It is possible that the sharp H absorption line which dominates the spectrum at minimum light continues to increase in velocity until it fades out, while at the same time a broad line with Stark wings is already present at a shorter wave length. The transition from peaked maximum to very nearly minimum velocity occurs in about 40 minutes. The rounded minimum of the A-type lines is probably real, in the sense that the deeper layers at first have a moderate velocity of recession, reaching minimum at phase $0.40P$. But there is no such rounding off at the peaked maxima, so that it would seem that the fading line from the upper level continues to show inward acceleration until it has disappeared. When the emission lines are absent, the transition is a more gradual one since there are then no peaked maxima.

During the present summer Dr. A. van Hoof and the writer have been observing the cluster-type variable XZ Cygni—suggested to us by Dr. E. C. Yowell, who has made an exhaustive