ABSTRACTS *

Athay, R. G., J. C. Pecker, R. N. Thomas and D. H. Menzel. A model of the chromosphere from 1952 eclipse data.

An analysis of the Balmer free-bound emission at $\lambda 3640$ and the continuum intensities at $\lambda 4700$ was carried out using data from the slitless spectrograms obtained by the High Altitude Observatory at Khartoum, Sudan. The data gave intensities at $\lambda 3640$ and $\lambda 4700$ at intervals of approximately 100 km between 0 and 2400 km above the limb and intensities at $\lambda 4700$ at many additional heights between 2400 and 48,000 km. The Balmer line data, which extended from 100 to 6400 km, was used to supplement the free-bound data for heights between 2400 and 6000 km. Values of electron density, N_e , and kinetic temperature, T_e , were determined at heights between 0 and 6000 km. The analysis was based on the assumption of a homogeneous chromosphere, with N_e and T_e depending upon height only. The continuum at $\lambda 4700$ was assumed to come from H^- emission and electron scattering of photospheric light.

The results of the analysis of the continuum data gave a chromospheric model that could be divided into three distinct regions with the following properties:

Region 1 (0 to 500 km). In this region T_e increases from $\sim 5000^\circ\text{K}$ at the photospheric limb (tangential optical depth ~ 1 , radial optical depth ~ 0.005) to $\sim 6000^\circ\text{K}$ at 500 km. Hydrogen begins to ionize near the top of this region with $N_p \rightarrow N_e$. This result is consistent with a marked increase with height of the quantity $N_e N_p T_e^{-\frac{1}{2}}$ in the region near 500 km, which was inferred from the Balmer free-bound and line emission. Thus it appears that the "boundary temperature," $T_{\min} \sim 4200^\circ\text{K}$, occurs below a radial optical depth of 0.005.

Region 2 (1000 to ~ 3500 km). The ionization of hydrogen increases from ~ 5 per cent at the base to ~ 99 per cent at the top of this region. T_e increases slowly from $\sim 6000^\circ\text{K}$ to $\geq 7000^\circ\text{K}$. The low gradient of T_e suggests that the external energy supply suffices only for the ionization.

Region 3 (~ 3500 km up). Further ionization of hydrogen is negligible and a large rise in T_e occurs. The free-bound emission is too weak to measure in this region and an accurate evaluation of T_e is difficult. An extrapolation of the free-bound intensities to 6000 km based on the ob-

served intensities of the Balmer lines between 2400 and 6400 km gives $T_e \sim 7 \times 10^4^\circ\text{K}$.

The analysis allowed an accurate determination of T_e in the region ≤ 1500 km, and the probable errors in the data plus the errors introduced in the analytical procedures were not likely to cause errors of more than $\pm 300^\circ$ in T_e . However, in higher regions the values of T_e were quite sensitive to the analytical procedures and errors of a factor 2 in T_e are possible. The eclipse spectrograms at heights above 5500 km show $H\alpha$, and all other strong chromospheric lines that persist to these heights, as irregular beaded structures. This irregular structure is presumably due to spicule activity at these heights and requires the consideration of a non-uniform chromospheric model, at least in the upper levels of the chromosphere. A study of the $Fe\ XI$ line at $\lambda 7892$ on the eclipse spectrograms showed that there was strong emission in this line at heights well below 10,000 km and suggested that the emission started in the regions where the chromospheric lines break up into a spicule structure.

The work reported in this paper was supported by the Office of Naval Research and carried out in close cooperation with the Naval Research Laboratory.

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Baum, W. A. Application of television techniques to astronomy.

Two major areas of technological progress have been responsible for most of the modern advances in observational astronomy; one has been the building of bigger and bigger telescopes to gather more and more light; the other has been the enormous improvement of light receivers, namely, photographic emulsions and photoelectric instruments. We have reached a point where the staggering cost of building appreciably bigger telescopes is far beyond our present resources, but the perfection of better image receivers for the light already available stands a good chance of accomplishing the same thing at comparatively modest expense.

* Of papers presented at the Ninety-first Meeting of the American Astronomical Society, Ann Arbor, Mich., June 20-23, 1954.