ture of the thermal motions of these atoms in the vicinity of the star may be of the order of 10^4 . In that case it is reasonable to expect fairly strong emission lines in the spectra of those stars which do not have enough radiation pressure to drive away the dust particles.

In addition to the five emission line stars, three faint stars of type A were found within the densest regions of the nebula. Their spectra have no emission lines and only number 16 looks abnormal because of the weakness of its hydrogen absorption lines. This may be an underluminous A star or possibly even a white dwarf. The rest of the stars have normal spectra of types K and M. Most of them are probably foreground stars while a few, near the edges of the nebula may be distant objects shining through the thinner portions of the cloud. Table I gives a list of the more interesting objects.

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Van Hoof, A. Colored atmospheres, true elements and limb darkening in eclipsing variables.

The methods of least squares which are being used for the determination of the geometrical elements of eclipsing binaries, though useful in many cases, have the disadvantage of increasing the number of unknowns and hence also the number of degrees of freedom. This increase may occasionally produce a misleading degree of accordance between the computed and the observed light curves.

The writer has preferred to devise a method for the determination of the true geometrical elements (k , i , r_a , r_b) and of the coefficient of limb darkening u , which involves only four points of the observed light curve: the amplitudes of both minima, the light and the phase angle at internal tangency, and the phase angle at external tangency. The solution proceeds graphically, is rapid and gives as high an accuracy as do more elaborate procedures.

Slight deviations were found between the observed and the computed light curves which seemed to indicate a departure from the classical law of limb darkening but which could be explained by assuming the existence of partially transparent atmospheres surrounding one or both components.

This conclusion was strengthened by another method. When "red" and "blue" light curves are

available for the same eclipsing variable with total and annular eclipses, these light curves can easily be reduced to the same scale so as to show in their ordinates the obscured fraction of the light of the eclipsed component. The ascending and descending branches of these reduced light curves intersect each other at points s and s' which in the case of the classical law of limb darkening are identical with the points in which the U and D curves derived by the new method will intersect.¹ The ordinates of these two points, in which $\alpha_s = \alpha_{s'}$ in the case of a total eclipse or $\alpha_s = \alpha_{s''}$ in the case of an annular eclipse, are functions of k which were derived from a comparison of Wend's tables for α with Zessewitsch's tables for α' and α'' . These functions were represented in a diagram having k as abscissae and α_s and $\alpha_{s'}$ as ordinates.

Theoretically it would be possible with the help of this diagram to derive immediately the real value of k of an eclipsing binary with a total eclipse. However, the application of this method showed that the observed ordinates α_s fell outside the range predicted by theory. Namely, $\alpha_s = 0.33$ for $k = 1.0$ and $\alpha_s = 0.50$ for $k = 0.00$. Furthermore it was shown that the differences between the ordinates of the reduced light curves were larger above s than below this point which is again in contradiction with the theoretical curves.

These discrepancies can be interpreted either as an indication that the classical law of limb darkening is not satisfactory or that $k_{\text{red}} \neq k_{\text{blue}}$ for the stars examined. Adopting the latter viewpoint leads us to the following conclusions: (1) the presence of extended stellar atmosphere with a different degree of transparency for different wave lengths causes an unequal duration of the eclipses in different colors—a result which could be erroneously attributed to a radial eccentricity of the orbit. (2) The colored atmospheres presumably have an ellipsoidal shape under the effect of the attraction of the other component. It is therefore possible that the light curve of an eclipsing binary may exhibit a β Lyrae type in one wave length and an Algol type in another. More generally the ellipticity of the components may prove to be a function of the wave length in which the observations have been made. (3) When there exists a difference between the period of axial rotation of the components and the period of orbital revolution, a tidal lag may be expected. This would explain such phenomena as the Nordmann-Tikhoff