SPECTROPHOTOMETRY OF EARLY TYPE STARS

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A photoelectric spectrum scanner attached to the 16-inch telescope of the Cerro Tololo Inter-American Observatory was used to determine the relative spectral intensity distribution for early type stars. Observations on a minimun of three nights per star have been obtained for about two hundred stars. The tracings extend from 3100 A to 6000 A. They were obtained with a slit width from 50 A to 80 A, and thus can be used also for a determination of the equivalent widths of H-beta, H-gamma, and H-delta. As a byproduct precise information on the monochromatic atmospheric extinction at Cerro Tololo is obtained. In this investigation special emphasis was given to Be stars.

The spectral intensity distribution is determined in magnitudes, relative to ϵ Orionis. A typical example for an early B-type star is shown in Fig. 1. In this Figure as well as in the subsequent similar one the hydrogen lines have been omitted. The curve in Fig. 1 can be described by the following parameters:

(1) a spectral gradient $dm/d1/\lambda$ for $\lambda > 4200$ A,
(2) a spectral gradient $dm/d1/\lambda$ for $\lambda < 3645$ A,
(3) the amount and position of the Balmer discontinuity,
(4) the equivalente widths of the three hydrogen lines.

A typical relative magnitude curve for a Be. star is shown in Fig. 2. For these stars a certain ambiguity exists in determining the amount of the Balmer discontinuity, depending on whether it is read off just shortward of 3645 A or at shorter wavelengths. Schematically the feature may be described by two parameters: the Balmer discontinuity read off at the head of the Balmer series, and another value read off at around 3300 A.

The parameters (3) and (4) are independent of the interstellar absorption and thus may serve to determine absolute magnitudes, spectral types, intrinsic colors, or other intrinsic properties of stars. Since they all are hydrogen parameters, and furthermore originate from the same energy level of the hydrogen atom, one may expect a correlation between them. Correlations do exist between any of these parameters, however, with a dispersion significantly superior to that caused by errors of the measured values. Thus part of the dispersion is an intrinsic property of stars. The physical significance of this intrinsic dispersion is now under study.

Monochromatic atmospheric extinction curves have been determined for Cerro Tololo for a period of almost three years. A typical extinction curve is shown in fig. 3. The extinction is apparently composed of three components: (1) the Rayleigh scattering component, (2) a neutral component, and (3) two ozone absorption bands. Al three components have been found to be variable.