

## $\epsilon$ AURIGAE A SPECTROSCOPIC BINARY.<sup>1</sup>

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IN his investigations made a few years ago on the more refrangible parts of stellar spectra, Dr. Eberhard was struck by the fact that in the spectrum of the well-known variable  $\epsilon$  *Aurigae*, which lies in the transition between types I and II, the series of hydrogen lines clearly extended farther beyond the H and K lines than is the case with stars of similar type. He suspected that the spectrum of the star should be regarded as the superposition of two spectra of different types.

Changes in the spectrum great enough to be recognized with the slight dispersion of the single prism spectrograph (*D*) used by Dr. Eberhard were not exhibited by plates taken at various times.

In the latter part of April and beginning of May, 1900, three spectrograms were obtained by Professor Hartmann with the large spectrograph (III) in connection with the 80 cm refractor, but a comparison of these plates in the region from  $\lambda 415$  to  $\lambda 455$  showed nothing striking. On November 9, 1901, and November 18, 19, and 22, 1902, Dr. Eberhard further photographed the spectrum of  $\epsilon$  *Aurigae* with the three-prism spectrograph (IV) designed by me three years ago for the photographic refractor of 32.5 cm aperture. A superficial comparison of the spectra taken in the latter year with those of the preceding year was sufficient to show that the spectrum had undergone a change. The thorough examination and measurement of the spectrograms which I at once began has so far furnished the result that the suspicions of Dr. Eberhard were well founded, and that the spectrum of  $\epsilon$  *Aurigae* is in fact the result of the superposition of two spectra, the one similar to that of  $\alpha$  *Cygni*, and the other lying between the first and second types, like  $\alpha$  *Persei* or  $\gamma$  *Cygni*.

At present the first-named spectrum is the more intense and

<sup>1</sup>Translated from advance proofs, furnished by the author, of a paper communicated to the *Kgl. Akademie der Wiss. zu Berlin*.

it is displaced relatively to the other toward the violet by an amount which would correspond to a velocity of from 30 to 40 km per second. The spectrum is now distinguished from that of the previous year principally by the fact that but few lines of the iron spectrum are recognizable in it. Most of the lines have disappeared, probably as a consequence of the relative displacement of the spectra, and practically the only lines recognizable are those of the spectrum similar to  *$\alpha$  Cygni*. Most of these appear double and are characterized by the fact that the component lying toward the violet is with few exceptions the stronger, and the boundary on the violet side of the double lines, which are often difficult to separate, is extremely sharp. This is particularly striking in case of the hydrogen lines, as is shown by a very successful plate taken by Professor Hartmann at my request on November 22, 1902, with the one-prism spectrograph (I) in connection with the 80 cm refractor.

*There can accordingly be no doubt that  $\epsilon$  Aurigae is a spectroscopic binary and probably one of very long period.*

Considerable difficulties have been encountered in the comparison and measurements of the spectra because of the complications which result from dissimilarity of the superposed spectra, particularly in certain parts of the spectrum. I intend to communicate later more fully the very interesting details as to the spectrum of this star, which will be regularly observed here.

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