Циркуляры Главной Астрономической Обсерватории в Пулкове

№ 1 Январь 1932

January 1932

POULKOVO OBSERVATORY CIRCULAR

№ 1

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On the spectrum of γ Cassiopeiae.

The problem of the origin of emission lines in the spectra of stars of the Be type remains unsettled up to the present, owing to the lack of exact observed data as to the intensities and contours of the emission lines.

In the view of obtaining material, a series of spectrograms of γ Cassiopeiae has been secured during 1930 with the three-prism spectrograph of the 30-inch refractor.

The plates have been standartized with the aid of a lightreducer installed on the spectrograph slit and illuminated by an artificial source of light.

The hydrogene lines H_β, H_γ and H_δ were measured with Hartmann's microphotometer. Drawing 1 gives samples of the contours of these lines.

The obtained contours made the integral intensities available[1].

Below are given the mean values of these integral intensities expressed in angstrom × intensity of the continuous spectrum near the given line.

	H_β	H_γ	H_δ
Int.	4.9	1.4	1.0
Number of plates	8	3	2

Considerable deviation from these mean intensities are noticeable on several plates.

For instance, for H_β the deviations reach 20%. In view of the great sensitiveness of the method applied these deviations cannot be due to measurement errors. In all probability, actual changes in intensity are taking place here. Indeed, the plates secured on the same day or on consecutive days show a good agreement of results. The character of contours is also subject to changes which may be considered real, though here the inaccuracy of measurement is more probable than in the integral intensities. In view of this fact the individual contours are given in drawing 1. The changes are evidently of a periodical character and the total set of measurements is well satisfied by a two-month period. In order to complete the data

[1] i. e. $\int (I - I_0)\, d\lambda$.

received, Dr. Shajn secured in Simeis, upon our request, 5 spectrograms, two of them on panchromatic plates, with the line H_α. These spectrograms were passed by him on Koch's microphotometer. Owing to the low dispersion of the Simeis spectrograph, only integral intensities could be determined. Measurements of H_α and H_β gave the following mean results:

	H_α	H_β
Int.....	60.5	6.6
Number of plates.....	2	5

It is evident that the integral intensity of the Balmer lines decreases very rapidly with the transition from H_α to higher lines of the series. This fact seems very significant and requires theoretical explanation. It is difficult, at present, to establish what intensities the emission lines ought to have, assuming they originate according to the mechanism proposed by O. Struve. Nevertheless we must expect that the conditions of excitation in the gaseous ring are somewhat intermediate between those of atoms in the solar chromosphere and the planetary nebulae. From this point of view the obtained ratio of intensities of Balmer's lines is inexplicable.

On the other hand, Struve's theory predicts a linear dependence between the width of the emission-line and the wave-lengths. The results of our measurements, given in Fig. 2, show that the condition of linearity is not satisfied. The deviation from the right line can hardly be explained by the fact, that in brighter lines the plate is affected by farther lying (less dense) portions of the ring, possessing a greater linear velocity. In fact, in the other layers of the ring, Kepler's motion ought to be kept nearly exactly.

In concluding, we consider it a pleasant duty to express to G. A. Shajn our gratitude for the material secured with the Simeis spectrograph.

V. Ambarzumian and *N. Kosirev.*

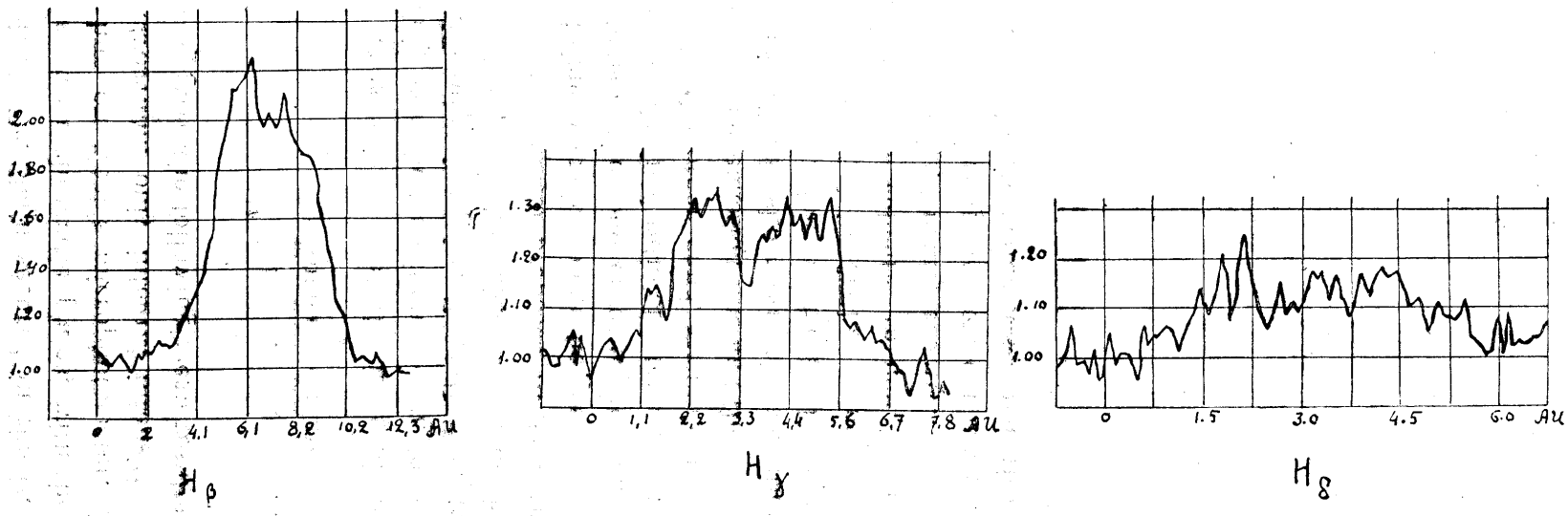

Fig. 1. γ Cassiopeiae. The contours of emission Balmer lines. Abscissae-wave-lengths, ordinatae-intensities.

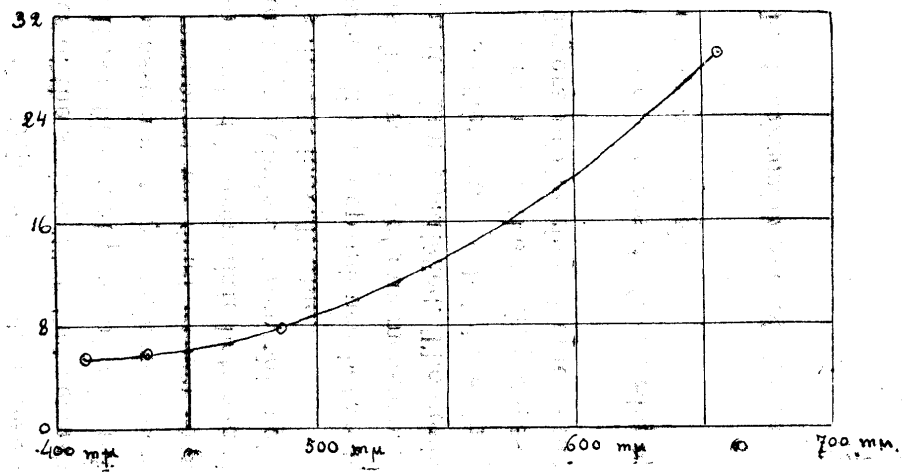

Fig. 2. γ Cassiopeiae. The widths of emission Balmer-lines. Abscissae-wave lengths, ordinatae-line widths.