

## DISCOVERY AND STATISTICS OF Be STARS

## Preliminary results

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In 1960, the authors have started at the La Plata Observatory a survey of bright B stars ( $m < 6.5$ ,  $\delta < 0^\circ$ , HD Spectral type O9-B5) for the discovery of emission in  $H_\alpha$ . A two prism spectrograph attached to the 80 cm La Plata telescope was used, with a camera giving a dispersion of 180 Å/mm. The slit was opened as much as possible in order to shorten the exposure times; as a consequence the region of good definition on the plates comprises only from 6000 to 6700 Å.

Up to now 274 stars were observed, and 45 of them show bright  $H_\alpha$  lines. There are six more doubtful cases which are being re-observed. Ten out of the 45 objects apparently have not been mentioned in the literature. The percentage of bright line objects is  $16 \pm 2\%$  which is somewhat higher than the 10% found earlier by Merrill in the same spectral range.

Thirty nine stars of our observing list are well known members of the Scorpius - Centaurus cluster, and six of them show bright lines. This gives a 15% of emission stars, in excellent agreement with the 16% derived from stars in the general galactic field. Incidentally, this is the first association in which so many Be stars have been found. This fact can be used in order to check whether the absolute magnitude of the emission stars is different from the absolute magnitude of the normal B stars. In table I are given the objects, their MK type, the absolute

magnitude according to the spectral type and absolute magnitude from the cluster parallax.

Table I

Name	Sp. type	$M_{MK}$	$M_{Cl}$	$\Delta M$
$\delta$ Cen	B2 V	-2.7	-3.58 $\pm$ .16	.9
$\mu^2$ Cru	B5 V	-1.4	-1.01 .17	-.4
$\mu$ Cen	B2 V	-2.7	-4.04 .20	1.3
$\eta$ Cen	B3 III	-3.3	-3.04 .12	-0.3
48 Lib	Bp	-	-1.38 .11	
$\chi$ Oph	B IV	-3.3	-3.22 .10	-0.1

From five objects (48 Lib has been excluded, because of its peculiar spectrum) the mean difference is  $+0^m.3$ , which is too small as to be considered reliable. Therefore we can consider that the absolute magnitude of the Be stars is normal.

A statistics of the sky distribution of these objects does not reveal areas of special concentration.

A statistics of the distribution of the observed objects over spectral types and luminosity classes has been carried out. For a 75% (204) of the stars the MK type exist. In table II the distribution over luminosities classes is given.

Table II

Luminosity Class	Total	Be	Percentage
V	106	20	19% $\pm$ 4
IV	55	6	11 4
III	24	1	4 4
II	11	1	9 9
I	8	2	25 15

The table confirms the known fact that the Be stars are concentrated in luminosity classes V - IV and I. At least 20 % of all stars in these three luminosities classes have emission lines.

Incidentally it is surprising that there are so many subgiants. This has an easy explanation: because of the different luminosity, the survey is carried out over different volumes of space. In order to correct the statistics, we have applied an increase (over the  $\bar{M}$  for class V) of  $0^m5$  for the subgiants and  $1^m0$  for the giants. With these corrections, the numbers become now

V	100 stars
IV	25
III	5

and refer strictly to the same volume of space.

We have tried to get additional information on the line from our spectra. On each plate we have measured therefore

- 1) the position of the emission line center
- 2) the position of both emission line borders
- 3) the width of the emission lines

All data are expressed in km/sec. It can be estimated that the velocities are accurate to  $\pm 25$  km/sec and the widths to  $\pm 75$  km/sec. The results are given in figures 1 and 2. From an inspection of these figures, the following conclusions are drawn:

- a) The emissions are in almost all cases displaced to the red of the absorption line. Only 10 % possess negative velocities.
- b) The mean velocity of the emission is 50 km/sec.
- c) The emission widths range between 100 and 700 km/sec, with

mean of 400 km/sec.

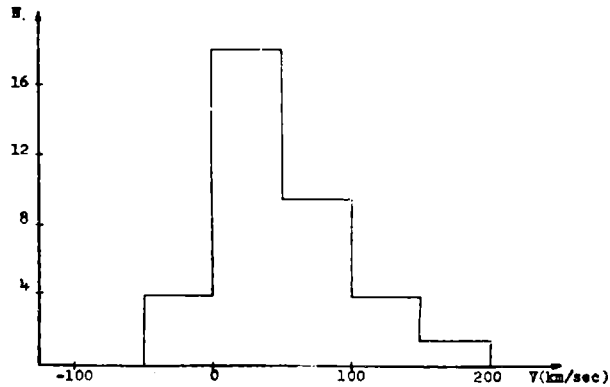


Figure 1  
Frequency diagram of the velocity of line centre

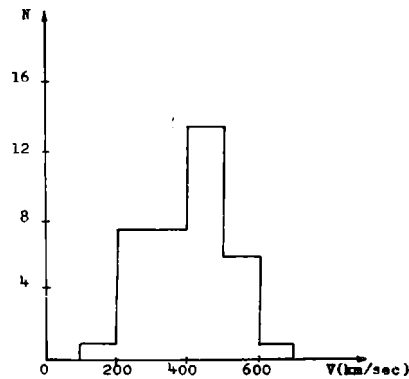


Figure 2  
Frequency diagram of emission width

The results of the present survey will be published in full elsewhere. This survey is to be repeated in a few years in order to get an idea about the time scale of the variation of the emissions.

It should be mentioned finally that all emission stars are being studied at a dispersion of 42 Å/mm at Córdoba.

Discusión:

Sahade: ¿El Dr. Henize no está haciendo un trabajo semejante?

Jashek (C): Efectivamente, pero se ocupa de objetos más débiles y además usa prisma objetivo.