Be STARS AS MEMBERS OF OPEN CLUSTERS

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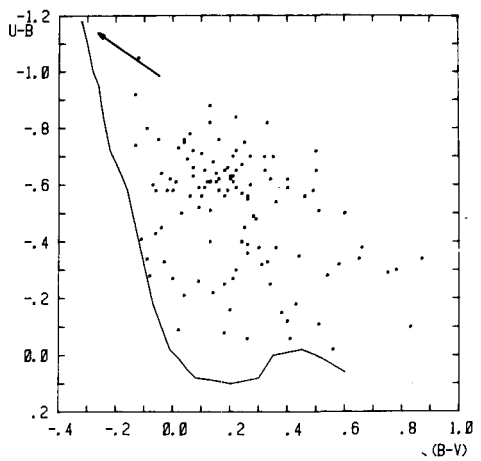
A list of 124 Be-type stars belonging to 52 open clusters has been compiled. All of them have photometric UBV data, and many of them spectral classification in the MK system. Besides, the cluster's distance modulus and the mean color excess from the member stars are known. Then, we have computed the absolute magnitude and the intrinsic colors of each Be star.

The observed color-color diagram (Figure 1) shows clearly that nearly all Be stars appear to be reddened. In Figure 2 is given the color-magnitude diagram, (B-V)o versus Mv, in which the ZAMS (Blaauw, 1963) is also included. A few stars to the left of the main sequence belong to the young open clusters: NGC 869, 6167, 6530 and 6611. This effect may be due to wrong correction of the color indices because of abnormal values of the reddening law. Other possibility results from a contamination with the bright nebula during the measurements. The rest of the stars are located to the right of the main sequence. For these stars

Figure 1. The B-V versus U-B diagram for Be stars in open clusters.



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the additional color excess is assumed to be due to a circumstellar envelope, or perhaps to gravity darkening of the underlying star. Some of the high luminosity stars $-6 < Mv < -4$ are situated in the range up to 0.3 magnitudes farther red in (B-V)o. In the (U-B)o versus Mv diagram (Figure 3) a similar distribution is seen, and in this case some stars are in a range of about 0.8 magnitudes farther to the right of the main sequence. It becomes clear that the influence of the circumstellar reddening is in some cases quite large. It is interesting to note that higher the absolute magnitudes, larger is the range in the intrinsic color (B-V)o as shown Figure 2. A similar conclusion results of (U-B)o in Figure 3.

Finally, as there are very few stars close to the ZAMS, the suggestion that some Be stars are relatively unevolved is not apparent in the diagrams. Also, we can conclude, in agreement with Slettebak (1985), that if we attribute the position of the Be stars in the color-magnitude diagram to some stage in their evolutionary tracks, they may exist in various evolutionary states.

REFERENCES:

Blaauw, A. (1963). In Basic Astronomical Data, ed. K. Aa. Strand, pp. 383. Chicago: Chicago University Press.

Slettebak, A. (1985). Astrophys. J. Suppl. Series, 59,769.

Figure 2. The (B-V)o versus Mv diagram for Be stars in open clusters. The ZAMS from Blaauw (1963) is also included.

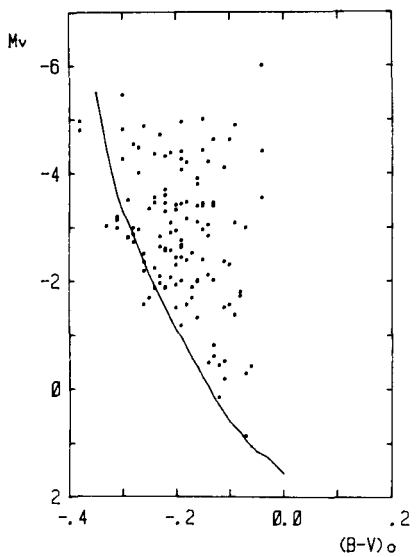
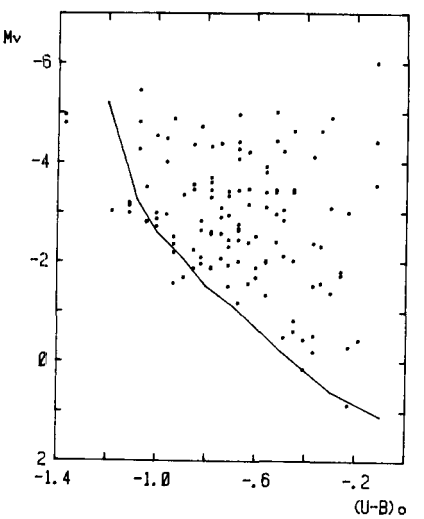


Figure 3. The (U-B)o versus Mv diagram for Be stars in open clusters.



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DISCUSSION FOLLOWING FEINSTEIN

Abt:

In your classifications of Be stars in open clusters, did you find any dependence of the frequency of Be stars on clusters age?

Feinstein:

No, but in this list there is a selection effect due to the fact that I include only Be with known photometric data.

Buscombe:

In the $M_V, (B - V)_o$ diagram, I suggest that it is possible that some of the points diverging far to the right may represent composite images of stars unresolved by the photometer.

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