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ON THE POSITION OF Ap-STARS TOWARD THE MAIN SEQUENCE

The problem of the coincidence of Ap-stars with normal stars of the same spectral classes on the main sequence is of great importance for the explanation of the mechanisms responsible for the Ap-star light changes. Simultaneously it also gives information on the relation of Ap-variables with other types of variable stars.

Studies of Ap-stars in the broad-band U,B,V system show that:

1. on the Hertzsprung-Russell diagram they represent a compact group in the limits of the main sequence (Khokhlova, 1970).
2. on the colour-colour (U-B)-(B-V) diagram their position does not differ significantly from the position of normal stars (Osawa, 1965; Eggen, 1967; Stepien, 1968).

With the aid of Strömngren's intermediate-band u,v,b,y photometric system Cameron (1966) establishes certain finer differences in the energy distribution of Ap-stars.

On the realization of the observational program for Ap-stars in a ten-colour photometric system of the Zentralinstitut für Astrophysik der AdW der DDR (Nikolov, 1974, 1977) the differences in the energy distribution of the discontinued spectra of Ap-stars toward main sequence stars were once more established.

Since the problem of Ap-star peculiarity is closely related to the peculiar energy distribution in their discontinued spectrum, we have undertaken an analysis of the behaviour of these stars on the colour-colour diagram and the Q-Q diagram of the ten-colour photometric system toward the normal stars of the

main sequence.

The so formed colour indices in this system according to Bartkevicius and Straizys (1970) may be divided into two types - those depending on the chemical composition and influenced by blanketing, and others which are slightly influenced by it and which may serve as indicators of temperature. Thus on the colour-colour U-P/P-Y diagram in Fig.1 the P-Y colour index depends strongly on blanketing, and U-P is the indicator of temperature. The main sequence is described in Fig. 1 by a dash-line, and the reddening line - by a solid line. For the construction of the main sequence observations made by Straizys, Drazdys et al. (1970) are used, as well as observations of standard stars in the ten-colour photometric system by Nikolov (1974). Besides the Ap-stars from Nikolov's (1974) work in the diagram additional 18 Ap-stars are indicated according to the data by Zdanavicius et al. (1969), Sudzius et al. (1970) and Bartkevicius et al. (1973). Ap-stars in Fig. 1 are denoted with crosses.

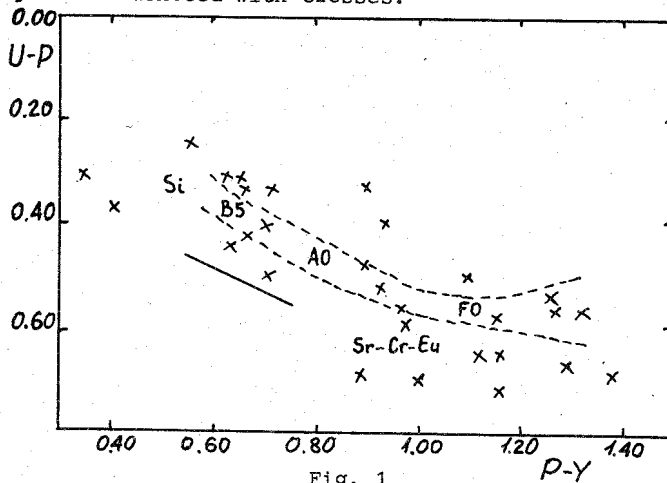


Fig. 1

The separation of the Si type stars from the Sr-Cr-Eu stars denoted by Cameron (1966) is well seen also in Fig.1. The Sr type stars and stars related to them are grouped under the main sequence or on it about at spectral class F0.

Independently from the fact that the reddening line on the discussed colour-colour diagram is almost parallel to the main

sequence and the position of Ap-stars on it is relatively slightly influenced by interstellar absorption, we do not know to what extent it has exerted influence. In order to exclude interstellar absorption influence we have built diagrams after the Q-parameters of Ap-stars observed by Nikolov (1974) according to the method by Bartkevicius and Zdanavicius (1975). The use of an iterative procedure on defining the individual Q-parameters of Ap-stars smoothens to a great extent their peculiarity in relation to normal stars - peculiar energy distribution in the discontinued spectrum.

The $Q_{U\text{PY}}/Q_{XYV}$ diagram (Fig.2) consists of Q-parameters obtained from colours depending comparatively strongly on blanketing. The denoting is as in Fig.1. The main sequence divides the region occupied by Ap-stars into two parts. In the upper part of the diagram are the Si Ap-stars, and in the lower part - the Sr-Cr ones. Here, as well as in the colour-colour (U-P)-(P-Y) diagram, the Ap-star region is partly covered by the main sequence.

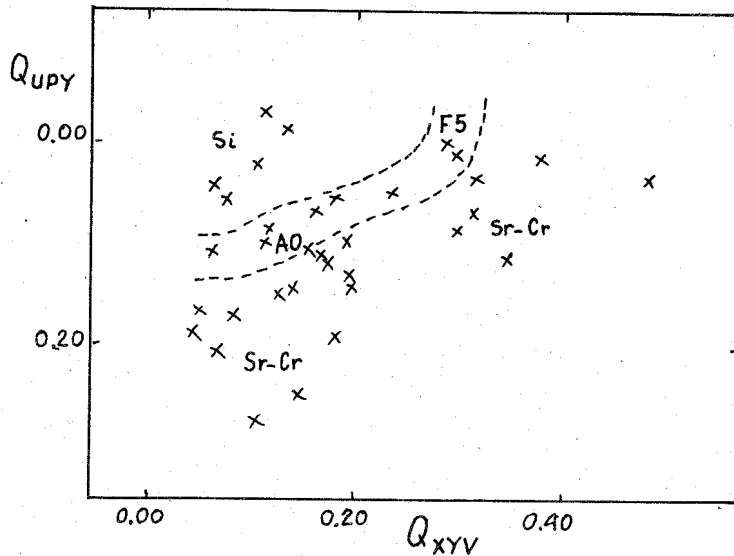


Fig. 2

Thus the problem for the belonging to the group of the Ap-stars is solved with different certainty. The defining of the

peculiarity type may be made more accurately.

The separation of Ap-stars from the normal ones in the Q-Q diagrams is important as a fact which demonstrates once more the large dynamic diapason of the Vilnius photometric system. It shows that the separation observed in the colour-colour diagrams, in spite that it is influenced by interstellar absorption, is a result of real differences between Ap-stars and normal stars.

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