ON TWO POSSIBLE GROUPS OF FLARE STARS IN PLEIADES

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ABSTRACT. The correlation between the magnitude of the proper motion and the mean frequency of flares for flare stars in the Pleiades cluster region is discussed.The magority of them are physical members of this star cluster.It is shown that there exist probably two groups of flare stars which differ each other by their parameters, in particular by the magnitude of proper motions. A possible explanation of this phenomenon is suggested.

The photographic observations of stellar flares in the Pleiades region show that for the flare stars having small proper motions the dispersion of the mean flare frequencies is very large meanwhile for the flare stars having comparatively large proper motions the mean frequencies of the flares are always small.

This is well seen in Fig.1 which represents the dependence between the quantity of the obsereved photographic flares k according to the chronological catalogue of the authors (see [1]) and, proper motions μ of the stars according to Jones [2] for the Pleiades flare stars. The total number of flare stars with the known proper motions in this system used by usis 230. They are comparatively bright stars.

One can notice on Fig. 1 that near the magnitude μ=2.5 really a gap is observed.

Jones [2] thinks that the flare stars of the Pleiades region having large proper motions are the stars of the general galactic field. However as was suspected [3,4] long time ago and has been shown by one of the authors [5] in the Pleiades the further from the centre of the cluster the smaller the number of flare stars irrespective of the magnitude of the proper motion i. e.practically all of these stars are members of the cluster.The number of flare stars belonging to the general galactic star field among them

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does'nt exceed 10% [6].

On the Hertzsprung-Rassell diagram of flare stars of the Pleiades cluster the mean frequency of the flares increases towards its right upper corner. This correlation can be presented by the formula

$$g = \frac{6}{7}(B-V) - \frac{1}{7}V + \text{Const} ,$$

where g is certain indicator of flare activity. Here B and V are stellar magnitudes.

In Fig.2 the correlations (k,g) and (μ,g) are presented,using the mean data on the considered parameters for five concentric regions having a thickness $0^{o}.5$ around the centre of the cluster.

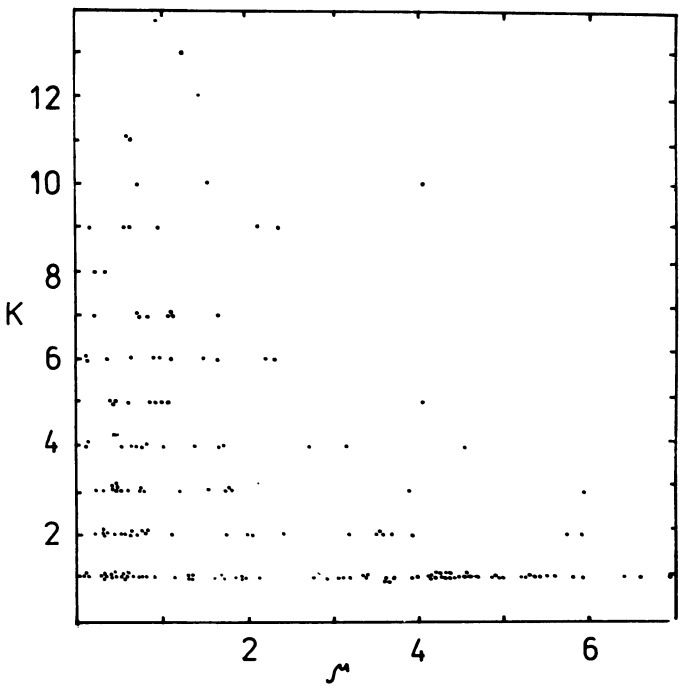

Figure 1. Observational data for flare stars on μ and k

A similar picture is observed on the correlation (g,Sp) constructed by us using the data on spectra of the Pleiades flare stars from the paper [7].

The correlation (k,g) shows that the number of observed flares k in average is increasing with the increasing of the magnitude g.

It means that really the magnitude g can be considered

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as an indicator of the flare activity level of flare stars.

The second coreelation (μ,g) on contrary gives an evidence of the decreasig of the proper motion with the magnitude g ,i.e. with the mean frequency of flares.

On the other hand ,both correlations (k,g) and (μ,g) show clearly that all flare stars in the Pleiades region can be devided into two separate groups which differ each other by their parameters (mean frequency of flares, proper motion and spectrum).

Thus the existence in the Pleiades cluster two groups of flare stars having different parameters is an observational fact.

It can be suggected different explanations of this unexpected result.

But the authors prefer the explanation ,according to which the flare stars having small proper motions are double and multiple ones, and the stars with large proper motions are single.

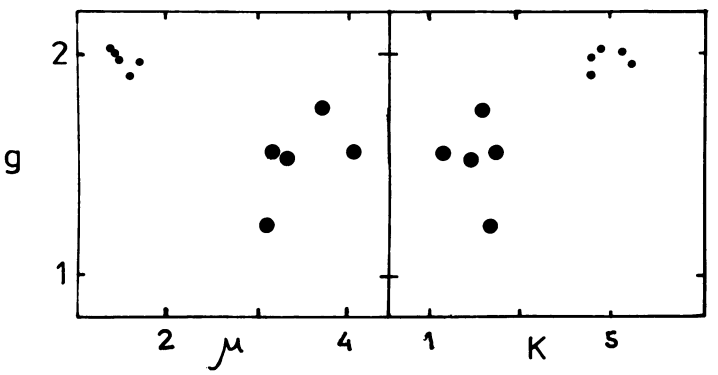

Figure 2. The dependence of the magnitude g from the number of observed flares- k and the proper motion- μ for two considered groups marked by small circles and large circles respectively.

It can be added that due to projection effect a part of flare stars which belong to the group of high-velocity stars can be observed when we use the proper motions as the members of low-velocity stars.

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