

LONG-TERM POLARIZATION CHANGES OF 88 HER

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Abstract

Linear optical polarization of 88 Her has been measured in V spectral region during the period 1974-1985. The mean annual values of the intrinsic polarization parameters are presented. The polarization percentage changes from 0.15% (1976) to 0.56% (1979). Small values of the polarization percentage correspond to the period when the envelope effect is negligible. The maximum of polarization percentage has been found during the early period of strong shell phase. The polarization position angle varies between 53 and 83 degrees.

In the period 1974-1985 the linear polarization parameters of 88 Her were measured with Belgrade polarimeter and 65cm refractor in V spectral region. The interstellar polarization parameters in the direction of 88 Her have been determined (from the data of nearby stars) to be: $P_{\star} = 0.28\%$ and $\theta_{\star} = 158^{\circ}$.

Fig. 1.

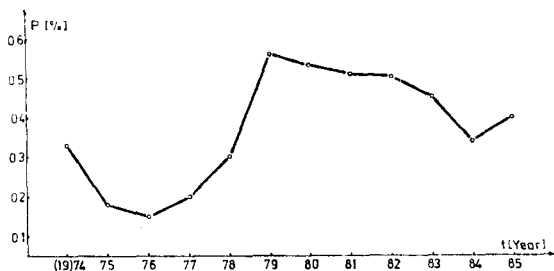
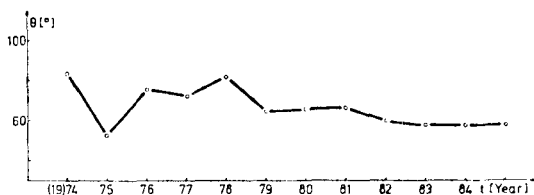


Fig. 2.

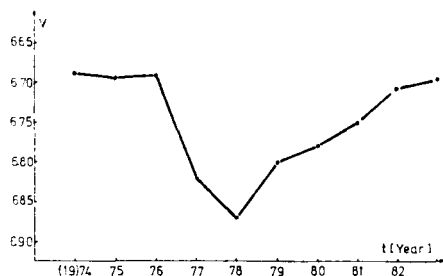


The annual mean values of the intrinsic polarization parameters P and θ are presented in Figures 1. and 2. The greatest r.m.s. errors of annual mean values are 0.04% in the percentage and 8° in the position angle. It is easily seen that polarization percentage has a minimum of 0.15 in the year 1976. The polarization percentage reached the maximum of 0.56% in the year 1979. The position angle has had the decreasing tendency (about $1^{\circ}.5$ per year) through the whole interval of time taking values between 83° and 58° , in the year 1974 and 1985 respectively. The largest dispersion of position angle were found before the year 1979, in the period of

small quantity of observed percentage what is normal consequence of the nature of measurements.

Annual mean values of the brightness in V colour from the data of Doazan et al. (1982) and Barylak and Doazan (1986) are shown in Figure 3. Translated for one year later, this light curve may be anticorrelated with the polarization percentage.

Fig. 3.



This shows the similarity of the cycles of the two processes. The end of the period of the high brightness was in the year 1976. That was the year of minimum polarization percentage. The fact that the polarization maximum was not observed at the period of brightness minimum but one year later may confirm Doazan et al. (1986) conclusion that the observed light decreasing is not connected with changes in the envelope of the star (decreasing

temperature or increasing of density) but with the cooling of the photosphere. The polarization effects might be a consequence of this process with a delay of approximately one year. During 1983 the brightness came back to that one of the year 1976, just before the decrease started. As for the polarization we can not say the same, it has the tendency to decrease but the values are still high.

The annual mean values of the emission peak intensities $E = (E_Y + E_R) / 2$ of H-alfa line for the period 1974-1979 taken from (Doazan et al., 1982) have a perfect correlation with polarization percentage. This is acceptable in the case that emission peak intensities correlate with electron density in the envelope. At the same time the correlation between polarization percentage and central H-alfa absorption does not exist.

Barylak and Doazan (1986) concluded that the effects of the envelope were negligible till the year 1976 - what turned out to be the period of small values of polarization percentage. Starting with 1977 a new shell has appeared. At the same time polarization has increased a little. During strong shell phase polarization percentage has reached its highest value of 0.56% in 1979, slowly decreasing after that. All values of the polarization percentage in the period of strong shell phase excluding 1978 value, are higher than the values not belonging to that period. Some colour indices of 88 Her from the paper of Barylak and Doazan (1986) have the changes very similar to polarization percentage variation but some of them have just the opposite picture.

The more detailed analyses are needed and have consequently been planned for the near future.

References

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