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ABOUT THE INTRINSIC POLARIZATION OF AW UMa

Polarimetric observations of the W UMa-type eclipsing binary AW UMa were made on five nights in March and April 1974. The observations were carried out using the polarimeter and reduction methods described by Piirola (1973, 1975). The polarimeter was attached to the 60 cm Ritchey-Chrétien telescope of the University of Helsinki. With a 40 s effective integration at each of eight position angles, the time for one observation was about 12 min. To obtain as good signal-to-noise ratio as possible, no light filters were used. The effective wavelength was about 4900 Å.

In Fig. 1 the observed normalized Stokes parameters of linear polarization, P_x and P_y, are plotted as a function of phase. Each point represents a single observation. The changes in observed polarization are very small and no clear systematic effects depending on orbital phase can be found. When the Stokes parameters were plotted against hour angle, to check for any systematic changes in instrumental polarization, no correlation between observed polarization and hour angle could be detected. Instrumental polarization was found to be very small and stable also by observations of nearby stars (Piirola 1975).

The mean values of the observed normalized Stokes parameters with their standard errors are given in Table 1 for each night. It can be seen that the mean values are practically zero, i.e. no significant intrinsic polarization is present. Also interstellar polarization is negligible, due to the short distance and high galactic latitude of the object.

Table 1 also gives the standard deviations of the normalized Stokes parameters around the mean values, σ_x and σ_y, and the quadratic means of the internal standard errors, $\overline{\sigma_{int.}}$. Internal standard errors are calculated from the measurements made at the eight position angles of the polarimeter. The deviations are not larger than is expected from photon noise.

Table 1

Mean values of normalized Stokes parameters for AW UMa. 1 mean value of P_x with standard error of the mean; 2 standard deviation of P_x; 3 mean value of P_y with standard error of the mean; 4 standard deviation of P_y; 5 quadratic mean of internal standard errors; 6 number of observations.

Date 1974	1 P_x (%)	2 σ_x (%)	3 P_y (%)	4 σ_y (%)	5 $\overline{\sigma_{int}}$ (%)	6 n
Mar 09	-.002±.007	±.026	.016±.006	±.033	±.026	35
Mar 26	-.005 .009	.039	-.005 .010	.037	.026	18
Apr 09	.008 .006	.022	.006 .007	.025	.019	12
Apr 11	.006 .006	.026	.019 .008	.033	.023	18
Apr 28	.013 .007	.023	.004 .008	.028	.022	14
mean	.003±.002		.011±.004			

It is clear that the changes in polarization of AW UMa were very small in the spring 1974, and no evidence for significant gaseous streams or disks could be found. Thus we can state that if the rather strong variable polarization of AW UMa observed by Oshchepkov in the spring 1972 (Oshchepkov 1974) is real, the mechanism producing the polarization has disappeared between the spring 1972 and the spring 1974.

V. PIIROLA

Observatory and
Astrophysics Laboratory
University of Helsinki

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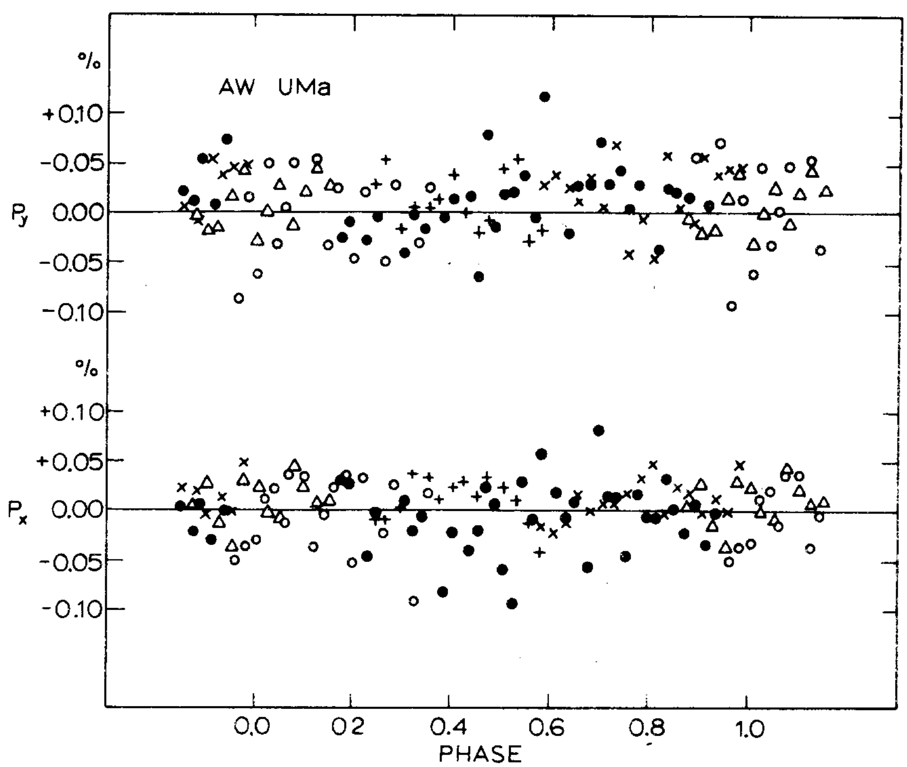

Fig. 1. The polarization parameters P_x and P_y, plotted as a function of phase for AW UMa. The symbols refer to the following dates: • 1974 March 09, o 1974 March 26, Δ 1974 April 09, × 1974 April 11, + 1974 April 28.