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PHOTOELECTRIC OBSERVATIONS OF THE Ap STARS HD 125248, HD 134793 AND HD 184905

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Lightcurves of the Ap stars HD 125248, HD 134793 and HD 184905 are presented. The periods $9^d.29477$, $2^d.78$ and $1^d.845251$ are found, respectively, for the stars HD 125248, HD 134793 and HD 184905 to be in accordance with the values previously known.

Key words: Ap stars – light variations – magnetic stars

1. INTRODUCTION

Photoelectric observations of the Ap stars HD 134793, HD 125248 and HD 184905 have been carried out at the Stellar Station of the Catania Astrophysical Observatory from 1967 to 1973, in our natural system using telescopes equipped with unrefrigerated EMI 6256 photomultipliers and Schott filters U(UG1 − 1 mm, $\lambda_{eq}=3500$, BW600), B(BG12 − 1 mm + GG13 − 2 mm, $\lambda_{eq}=4370$, BW900) and V(GG14 − 2 mm, $\lambda_{eq}=5400$, BW600). For each colour sequences of one minute measurements in the order SC_1 SVSVSC_2 SC_1 S (where S is the sky, V is the variable and C_1 and C_2 are the comparison stars) were recorded by potentiometric-type strip chart Speedomax recorders; each sequence gives one observed point. The observations were corrected for atmospheric extinction using extinction coefficients determined for each night. The characteristics of the comparison stars and the used telescopes are reported in table 1. The internal accuracy of the measurements is ± 0.005 mag. The number of observations per year and the seasonal value of the extinction coefficients are listed in table 2, where the year code is also given.

For the stars HD 134793 and HD 184905 we found partially systematic differences between runs in different years which were determined to be due to changes of the reflecting power of the mirrors, to substitution of the phototube and to other changes in the device equipment generally occuring in such a long period of time. Neverthless the Δmag shifts were of the order of ± 0.01 mag. Any long period variation of the variable or the comparison stars is excluded.

The periods of the light variations have been determined using a method similar to the one by Lafler and Kinman (1965). Our method consists in searching the family of periods which minimize the scatter of the observations with respect to the mean curve computed for a given value of the period in the succession $P=P_0+n\Delta P$, where n is an integer going from zero to 999 and ΔP is the increment of the period generally fixed in 0.001 days. The estimated periods are then selected and improved by taking into account the maximum or minimum light epochs available in the literature.

All the calculations were performed by means of the Catania University terminal of the CDC 7600 of Bologna.

Individual observations $(m_{var}-m_{c1})$ versus JD have been sent to the IAU Comm. 27 depository of observations on variable stars through Dr. W.S. Fitch, Steward Observatory, University of Arizona, Tucson, Arizona 85721.

2. HD 125248 (=CS Vir=HR 5355)

Recent photoelectric observations of HD 125248 have been carried out by Maitzen and Rakosch (1970). Wolff and Wolff (1971), Maitzen and Moffat (1972). All these observations confirmed the period $9^d.295$ found

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by Deutsch (1947) from the line intensity variations and gave also evidence of a double wave variation in the *V*.

Our photoelectric observations of HD 125248 have been carried out during the years 1969, 1970 and 1971. None of the comparison stars showed appreciable light variations during the whole period of observations.

The period which best fits the observations is 9.29477 days. The assumed ephemeris elements are:

$$\begin{aligned} \mathrm{JD}_{\odot}\,(U \text{ light min}) = 2440284.68 + 9.29477E \\ \pm 0.01 \pm 0.00005 \end{aligned} \qquad (1)$$

The magnitude differences HD 125248 – HD 124683 in all three colours versus the phase computed by means of the ephemeris elements (1) are shown in figure 1. Different symbols indicate the various years of observations. From figure 1 it is evident that the light variations remained unchanged in shape and amplitude during all three years of observations.

3. HD 134793

Apart from a few measurements carried out by Abt and Golson (1962) in the *UBV* system, no other photoelectric observations are available for this star in the literature. Recently a period of 2.7806 days for the light variations has been determined by Maitzen (1976).

HD 134793 was observed photoelectrically at the Stellar Station of the Catania Observatory from 1970 to 1973. The magnitude differences HD 134793 minus HD 134827 are reported in figure 2 versus the phase computed by the ephemeris elements:

$$\begin{aligned} \mathrm{JD}_{\odot}\,(V \text{ light max}) = 2441060.5 + 2.7800E \\ \pm 0.1 \pm 0.0001 \end{aligned}$$

Different symbols indicate the various years of observations.

4. HD 184905

Photoelectric observations of HD 184905 have been carried out by Burke *et al.* (1970), who suggested a period of 1.855 days, and by Morrison and Wolff (1971), who found a period of 2.17 days. Spectroscopic observations by Kumaigorodskaya and Chunakova (1973) corroborated that the hydrogen lines vary in the 2.17 days period showing a double wave. Photoelectric observations in *UBV* by Hildebrandt (1975) gave a period of 1.845031 days which was also confirmed by photoelectric observations in ten colours by Schöneich *et al.* (1976).

HD 184905 was observed photoelectrically from 1967 to 1971 and the lightcurves of figure 3 has been obtained. The phases have been computed from the ephemeris elements:

$$\begin{aligned} \mathrm{JD}_{\odot}\,(U \text{ light max}) = 2440017.90 + 1.845251E \\ \pm 0.01 \pm 0.000010 \end{aligned}$$

A secondary maximum seems to be present at the phase 0.5.

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Table 1 Data on programme stars, comparison stars and the telescopes used. The spectrum and peculiarity type for the programme stars are from Osawa (1965). The photometric data and the spectrum for the comparison stars are from "Photoelectric Catalogue" (Blanco *et al.* 1968), "Catalogue of Bright Stars" (Hoffleit 1964) and "Henry Draper Catalogue" (Cannon and Pickering 1918).

PROGRAMME STARS			COMPARISON STARS					Telescope
star	Sp	Pec.type	star	Sp	V	B-V	U-B	aperture
HD 125248	AOp	Cr-Eu	HD 124683	B9	5.25	-0.06	-0.05	30 cm
			HD 125048	A3	6.89	-	-	
HD 134793	A3p	Sr-Cr-Eu	HD 134827	A5	7.7	-	-	91 cm
			HD 135025	F5	8.6	-	-	
HD 184905	B9p	Si-Cr-Sr	HD 184875	A2	5.35	+0.05	+0.09	91 cm
			HD 184787		-	-	-	

Table 2 Number of observations, seasonal values and standard deviations of the extinction coefficient for each program star. Near to the year the code used to distinguish the different years of observations in the figures is reported.

Year and code		Number of observations / Mean value of the extinction coefficient / Standard deviation								
		HD 125248			HD 134793			HD 184905		
		U	B	V	U	B	V	U	B	V
1967	×							23 .745 .166	24 .476 .190	22 .279 .182
1968	△							73 .605 .162	72 .412 .151	67 .257 .192
1969	●	32 .600 .126	26 .346 .087	26 .185 .057				102 .768 .321	96 .545 .369	96 .406 .323
1970	+	16 .687 .217	17 .433 .186	18 .263 .163	24 .645 .024	26 .391 .045	23 .262 .036	85 .625 .152	88 .390 .140	72 .237 .205
1971	○	76 .692 .263	64 .412 .190	62 .286 .236	63 .696 .156	60 .423 .109	56 .299 .066	68 .650 .072	70 .450 .113	91 .229 .060
1972	✱				24 .732 .421	21 .490 .272	20 .336 .250			
1973	▲				8 .630 .073	7 .383 .130	7 .344 .101			

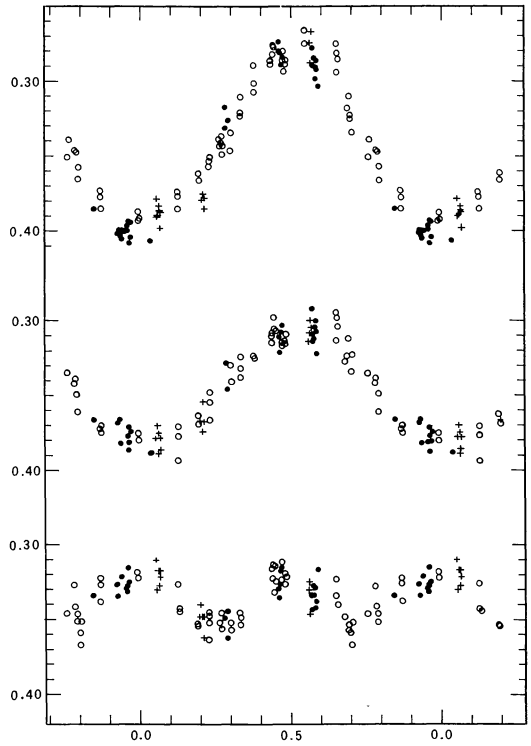

Figure 1 Magnitude differences HD 125248 – HD 124683 versus the phase computed from the elements JD_o (U light min)= 2440284.68+9.29477E. Code is as follows: ● = 1969, + = 1970, ○ = 1971.

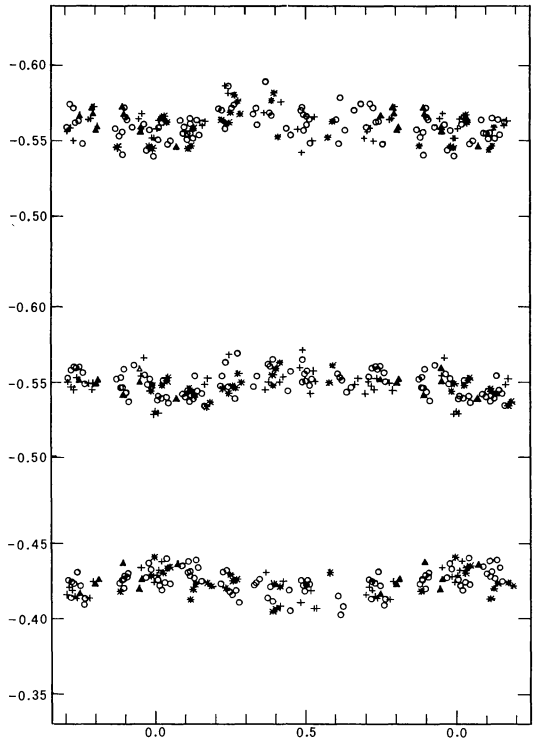

Figure 2 Magnitude differences HD 134793 – HD 134827 versus the phase computed from the elements JD_o (V light max)= 2441060.5+2.78E. Code is as follows: ○ = 1971, ∗ = 1972, ▲ = 1973.

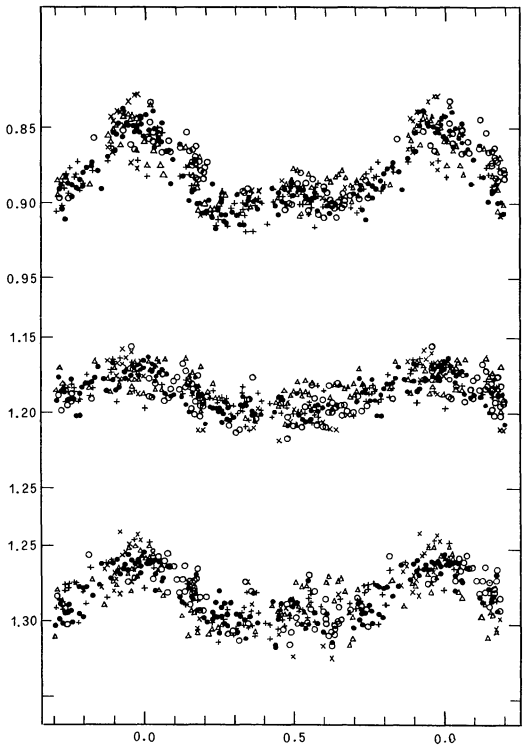

Figure 3 Magnitude differences HD 184905 – HD 184875 versus the phase computed from the elements JD_o (V light max)= 2440017.90+1.84525E. Code is as follows: × = 1967, △ = 1968, ● = 1969, + = 1970, ○ = 1971.