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STARSPOTS ON THE RED DWARF GLIESE 490 A

Gliese 490 A is the brighter component ($V=10.6$) of the visual double BD +36^o2322 ($RA=12^h55^m19^s$; $Dec=+35^o29'8$; epoch 1950.0). The secondary ($V=13.2$) is 17 arcsec from the primary and has exceptionally strong emission lines according to Dyer (1954). Joy and Abt (1974) classified the stars as dM1.5e and dM3.5e, respectively, the e indicating hydrogen Balmer lines in emission.

Gliese 490 A was observed by Bopp and Espenak (1977) in their survey of M-dwarfs, looking for periodical low amplitude brightness variations due to starspots in the photospheres of these stars. They did not detect any variations in Gliese 490 A larger than about 0.01 mag.

We have observed Gliese 490 A with the 91 cm telescope and a pulse counting photometer at McDonald Observatory. The detector was a RCA C31034 photomultiplier cooled with dry ice to -78°C . The following filter combinations were used to approximate the UBVR-system:

U : 2 mm UG 2 + 2 mm BG 18
B : 4 mm BG 12+ 2 mm BG 18 + 1 mm GG 4
V : 3 mm GG 495+2 mm BG 18
R : 2 mm OG 550+1 mm RG 6

All measurements were done through a 16 arcsec circular diaphragm, and we were particularly concerned with centering Gliese 490 A to avoid any contribution from the fainter secondary star. Ten seconds integrations were done in each filter, and the data were reduced differentially with respect to the comparison stars SAO 63287 and SAO 63286. Extinction stars were measured several times each night.

We also measured the stars through two narrow band filters

Table 1

Differential magnitudes and colours in instrument system

Date (UT)	Gliese 490 A - SAO 63287				SAO 63287 - SAO 63286			
	ΔV	$\Delta(U-B)$	$\Delta(B-V)$	$\Delta(V-R)$	ΔV	$\Delta(U-B)$	$\Delta(B-V)$	$\Delta(V-R)$
April 1979								
3.44	2.86	0.58	0.43	0.42	0.12	0.01	0.01	0.01
4.23	2.84	0.54	0.43	0.41	0.14	0.02	0.02	0.01
4.45	2.82	0.55	0.44	0.39	0.14	0.01	0.01	0.01
5.23	2.83	0.58	0.43	0.41				
5.43	2.85	0.53	0.42	0.41				
6.20	2.90	0.56	0.42	0.42				
6.46	2.88	0.54	0.43	0.42				
9.33	2.88				0.12			

Table 2

H-alfa and H-beta indices for Gliese 490 A and comparison stars

Date (UT)	H-alfa index			H-beta index		
	490A	SAO 63287	SAO 63286	490A	SAO 63287	SAO 63286
April 1979						
3.44	0.757	0.748	0.758	2.551	2.674	2.674
4.23	0.751	0.750	0.752	2.601	2.663	2.676
4.45	0.748	0.749	0.744	2.561	2.673	2.680
5.23	0.737	0.748		2.604	2.674	
5.43	0.745	0.742		2.636	2.671	
6.20	0.747	0.745		2.608	2.682	
6.46	0.720	0.746		2.632	2.689	
Average	0.744	0.747	0.751	2.599	2.675	2.677
ts.d.	.012	.003	.007	.032	.008	.003

centered at H-beta (FWHM=30 A and 150 A, respectively) and through two filters centered at H-alfa (FWHM=55 A and 115 A, respectively). The H-beta and H-alfa indices defined as

$$\text{index} = -2.5 \log \frac{\text{Flux through narrow filter}}{\text{Flux through wide filter}}$$

are essentially extinction free.

Table 1 presents the broad band differential magnitudes and colours in the instrumental system. The accuracy is 0.01-0.02 mag (somewhat larger in U-B). We find that Gliese 490 A varies with a total amplitude of 0.08 mag in the V-band, but we are not able to detect significant changes in the colour indices.

Figure 1 indicates a period of about 3.1 days.

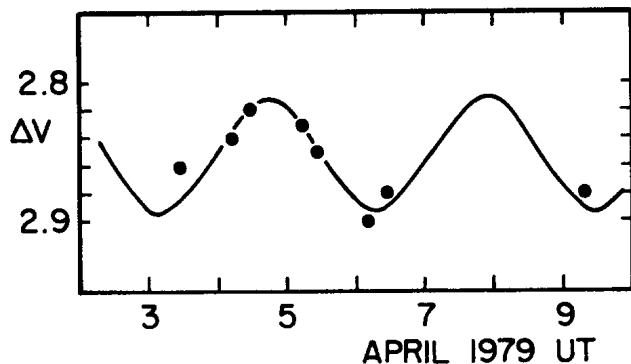


Table 2 presents the H-alfa and H-beta indices. They are found to be basically constant when we take into consideration the higher countrates from the comparison stars.

Gliese 490 A seems to be another example of a spotted red dwarf observed during periods when it had photometric spots and when it did not.

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