

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4265

Konkoly Observatory
Budapest

14 November 1995

HU ISSN 0374 - 0676

HS2324+3944: A NEW H-RICH PULSATING PG 1159 WHITE DWARF

With an effective temperature of $(130\,000 \pm 10\,000)$ K, and a surface gravity corresponding to $\log g = 6.2 \pm 0.2$, HS 2324+3944 is a peculiar PG 1159 star: it is the only star of this class, not surrounded by a nebula, showing H Balmer absorptions in its spectrum (Dreizler et al., 1995). If the pulsation mechanism based on the C/O cyclic ionization, proposed by Starrfield et al. (1984), is at work, the high H abundance found in the atmosphere ($\text{He}/\text{H} = 0.5$ by number) should drop to zero very quickly in the driving regions. Such a strong decrease of hydrogen looks quite unlikely; for this reason the presence of pulsations in HS 2324+3944 seems to be a very interesting phenomenon.

I observed HS 2324+3944 with the 2-head photoelectric photometer of the 1.5 m Loiano telescope (Bologna Astronomical Observatory) on October 19 and 20, 1995, with no moon. The tubes used, two EMI 9784 QB, have a maximum sensitivity in the B band. Both observations were done without filter, with an integration time of 2 s. The original light curves are shown in Figure 1 and 2, whereas in Figure 3 and 4 the magnitudes corrected for extinction are presented. The comparison stars of the two observations are different. In the first observation the comparison star ($\text{RA}=23^{\text{h}}27^{\text{m}}33^{\text{s}}$, $\text{D}=+39^{\circ}48'.9$ (1950.0)) is about 0.5 mag fainter than HS 2324+39 whose V-magnitude is about 14.8. The sharp light increment between BJD 0.317 and 0.410 in October 19 is not due to any instrumental failure or astronomical reason. This effect disappears almost completely taking the difference of magnitude (Figure 3) (not completely because the diaphragms of the 2 channels of the photometer are different). In the second observation the comparison star ($\text{RA}=23^{\text{h}}27^{\text{m}}35^{\text{s}}(\pm 18^{\text{s}})$; $\text{D}=+39^{\circ}43'.6(\pm 3'.5)$ (1950.0)) is about 2 magnitudes brighter than HS 2324+39. For this reason there is almost no difference between channel 1 and (1-2) in Figure 4. Near BJD 0.41 (October 20) the comparison was close to the border of the aperture. In both light curves we can see several arc features with a mean period of about half an hour. In Figure 5 the data distribution for both nights is shown, folding the two light curves with a period of 35 min. In the power spectra of the two nights the amplitudes of the 35 min pulsation are 9 mmag (19/10/95) and 15 mmag (20/10/95). Apart from the 35 min periodicity, there are not other peaks with amplitude higher than 5 mmag in both power spectra. Probably more data are required to find other possible pulsation frequencies. In any case further and more detailed analysis of these data will be performed.

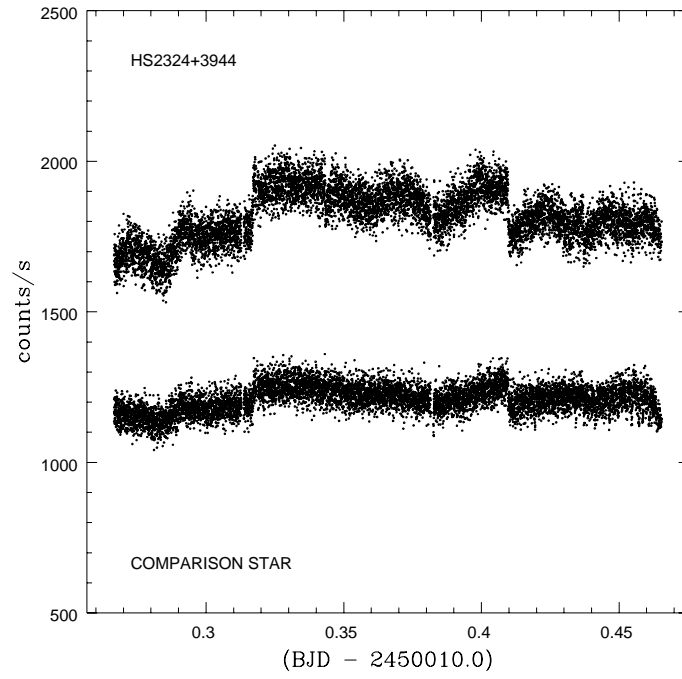


Figure 1. Counts light curve of HS 2324+3944 in October 19, 1995.

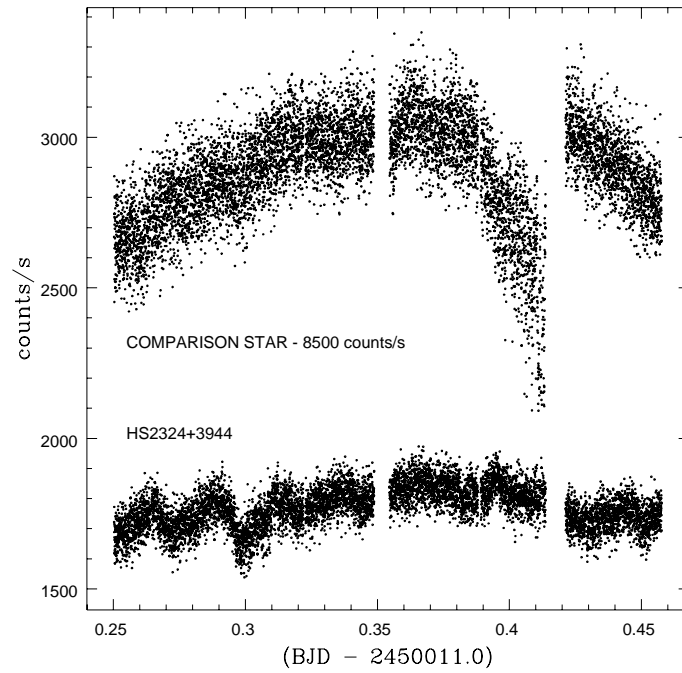


Figure 2. Counts light curve of HS 2324+3944 in October 20, 1995.

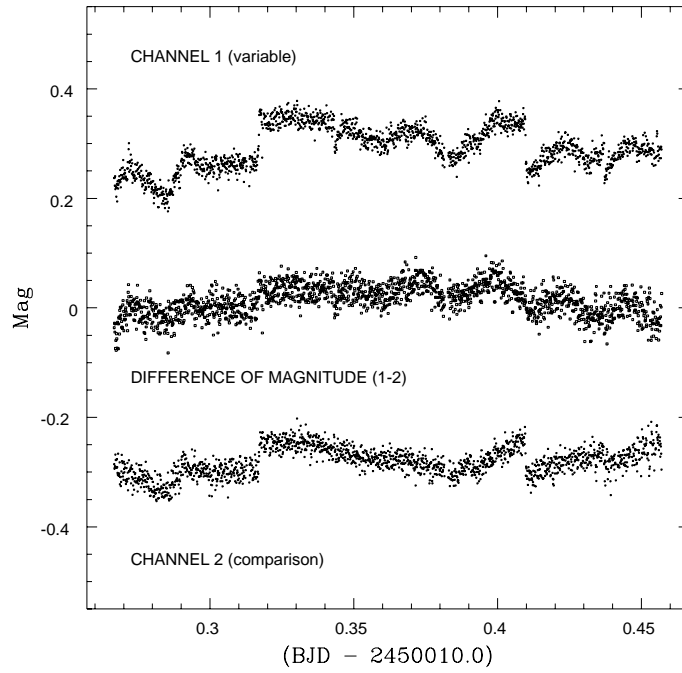


Figure 3. Magnitude light curve of HS 2324+3944 in October 19, 1995. The spurious light increment in channel 1 and channel 2, from about BJD 0.317 to 0.410, disappears almost completely considering the difference of magnitude.

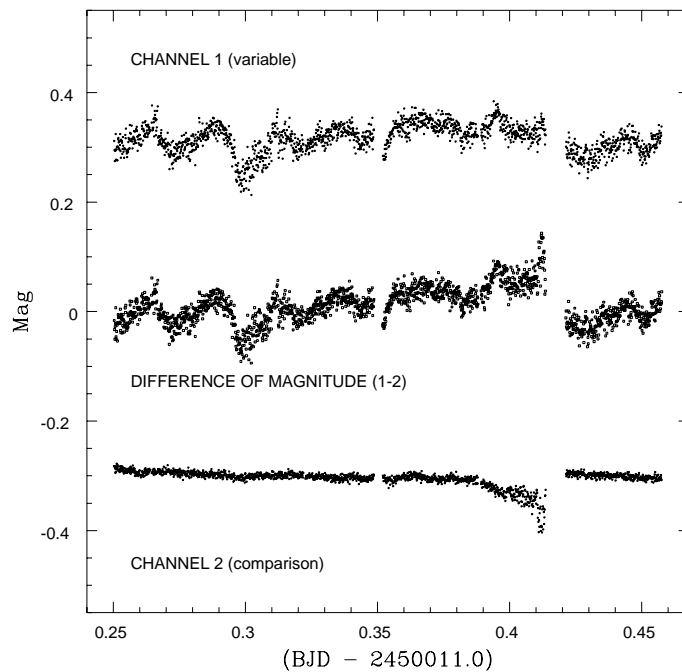


Figure 4. Magnitude light curve of HS 2324+3944 in October 20, 1995. The comparison star has been recentered in the aperture near BJD 0.413.

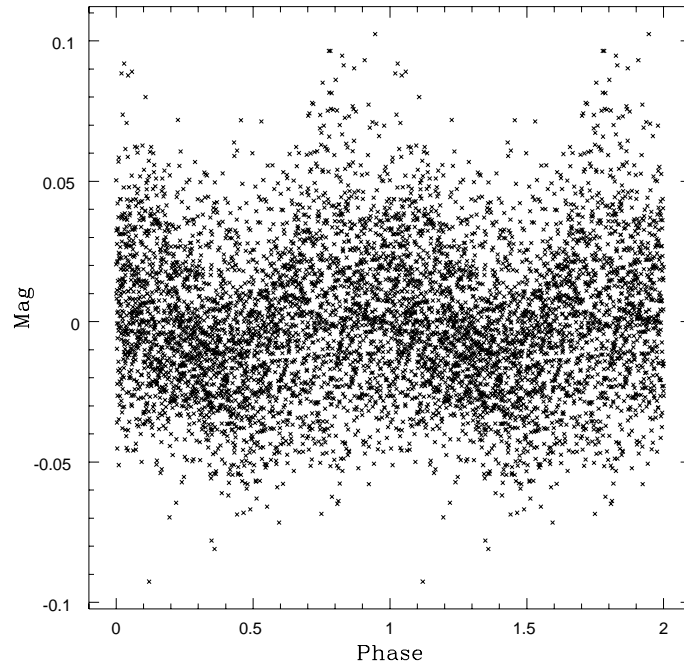


Figure 5. Distribution of the data of both nights, folded with a period of 35 min.

I am pleased to acknowledge Klaus Werner, who suggested to observe this star and provided me the finding chart.

Roberto SILVOTTI
Dipartimento di Astronomia
Università di Bologna, Italia

References:

- Dreizler, S., Werner, K., Heber, U., Engels, D., 1995, *A&A* in press
Starrfield, S., Cox, A.N., Kidman, R.B., Pesnell, W.D., 1984, *ApJ*, **281**, 800