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PHOTOMETRIC VARIABILITY OF 27 CYGNI

27 Cygni (HR 7689, HD 191026, KO IV, V = 5.36^m) is used as a "red standard" in a long-term UBV photometric campaign on Be stars (Harmanec, Horn and Koubský 1982). The star also appears on a list of forty suspected variable stars (Fekel and Hall 1985). Several groups of astronomers were therefore observing the star in 1985, and in this paper, we present our combined data.

These observations were made with several telescopes. Basic information about the observers, instruments and observational technique used is summarized in Table I. All the observations were reduced to differential magnitudes on the standard UBV system.

The analysis of the observations was further complicated by the fact that not all observers used the same comparison stars. Some used 22 Cyg (HR 7613, HD 188892), the local comparison star in the Be star campaign; others used 21 Cyg (HR 7615, HD 188947), which was suggested by Fekel and Hall. The constancy of 22 Cyg has been checked by repeated use of the check star 36 Cyg, but the constancy of 21 Cyg has not yet been checked. Neither of these two is a suitable comparison for 27 Cyg in fact. 22 Cyg is a blue star and its long-term constancy has yet to be verified. 21 Cyg is a suspected variable (CSV 101914 = NSV 12586) and a multiple system of at least 5 stars. Considering the high incidence of variables among the brighter stars in Cygnus, any future observations should be carried out with at least two different check stars until the present situation is clarified. 15 Cyg and 39 or 42 Cyg appear at the moment as the best available candidates for a comparison and a check star, respectively.

The values of (V, B-V) given by Nicolet (1978) for 22 Cyg and 21 Cyg are (4.94, −0.08) and (3.89, +1.02). Harmanec, Horn and Koubský, in the Bright Be Star Observing Programme, Release 5, prefer (4.95, −0.09) for

Table I

Observers	Observatory Telescope	Photometer, Tube	Filters	Comparison	Check
Harmanec, Horn Koubský, Kříž, Božić	Hvar 0.65-m Cassegrain	DC EMI	UBV	22 Cyg	36 Cyg
Hoff and Kelsey	Hillside 0.4-m reflector	Starlight 1 PC	BV	21 Cyg	-
Landis	Landis 0.2-m Newtonian	DC IP21	V	21 Cyg	-
Percy and Richer	Univ. of Toronto 0.4-m Cassegrain	DC EMI	BV	22 Cyg	36 Cyg
Reisenweber	Rolling Ridge 0.2-m Celestron compound	Optec SSP-3 solid state	V	22 Cyg 21 Cyg	-
Wasson	Sunset Hills 0.2-m reflector	PC	V	21 Cyg	-

22 Cyg, and we have adopted those values. Because of potential problems in combining observations from many and varied sources, we adopted the following procedures: the (V, B-V) observations obtained at Hvar Observatory were adopted as standard, and all other observations were fitted to them. This required a small adjustment of $+0.010^m$ to the (B-V) values of Percy and Richer, an adjustment of -0.03^m to the V values of Hoff and Kelsey, and an adjustment of $+0.042^m$ to the V values of Reisenweber using 22 Cyg as the comparison. The light curve obtained using the values so obtained is shown in Figure 1, together with the corresponding data for the check star.

The variability amounts to about 0.05^m in V. A similar range of variation can also be found in the previous published all-sky photometry of 27 Cyg (c.f. Blanco et al. 1970). The variability is apparent in all of the long sets of data, though it is less apparent in the combined data

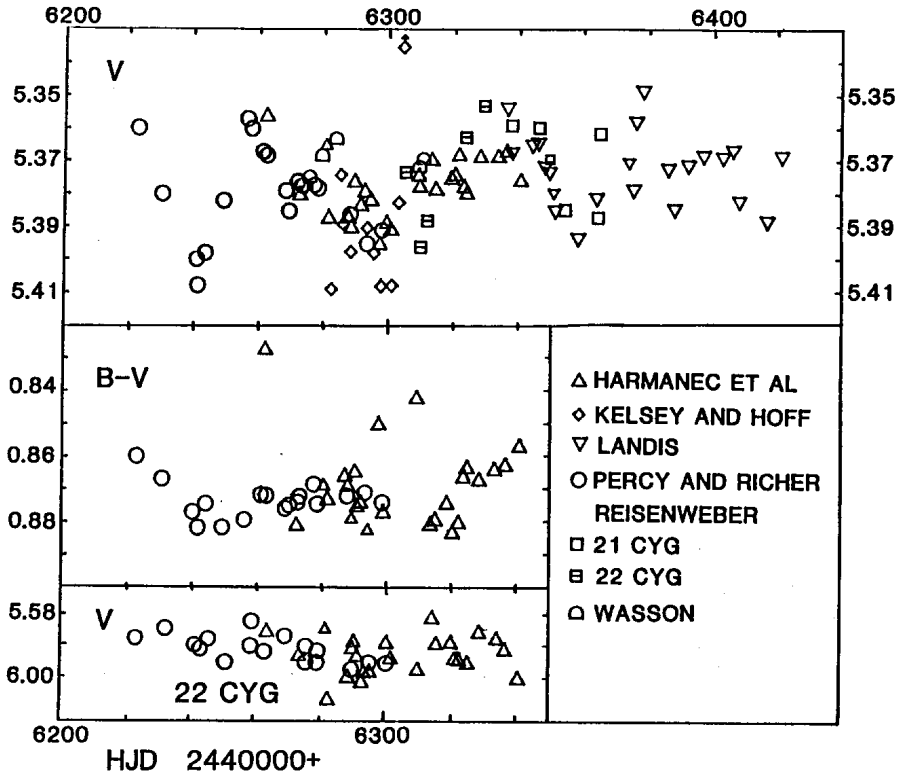

Figure 1: The light and colour curves of 27 Cyg (upper and middle panel) and the light curve of the comparison star 22 Cyg (lower panel). Slightly smaller symbols represent points of slightly lower accuracy.

because of the extra scatter contained therein. The behaviour does not appear to be strictly periodic, although no period analysis has been attempted at this stage. Variations seem to have a characteristic time scale of about 50-60 days. The cause may be pulsation, or more likely the rotation of a spotted star. However, more rapid variations may also be suspected in some data sets, and should be checked by future observations. A part of these rapid fluctuations is probably connected with the relatively low signal-to-noise ratio of the data (as evidenced by the plot for the check star), but the variability of the comparison star 21 Cyg also cannot be excluded at present. Radial velocity observations of the star are

sparse, but there are no reports of velocity variations. Further photometric and spectroscopic observations of this bright variable star are certainly warranted.

The observations have been deposited in File 187 in the Archive of Unpublished Photoelectric Observations, maintained by IAU Commission 27 (Breger 1982).

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