

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

Number 5035

Konkoly Observatory
 Budapest
 22 February 2001

HU ISSN 0374 – 0676

J1714.9+4210: A VARIABLE FAINT HIGH-LATITUDE CARBON STAR

MEUSINGER, H.; BRUNZENDORF, J.

Thüringer Landessternwarte Tautenburg, D-07778 Tautenburg, Germany
 e-mail: meus@tls-tautenburg.de, brunz@tls-tautenburg.de

As a by-product of a variability–proper motion survey for quasars (Brunzendorf & Meusinger 2001), we detected a further member of the class of faint high-latitude carbon star (FHLCS). It was classified, at first, as a quasar candidate due to its strong variability and zero-proper motion, but was spectroscopically confirmed as a carbon star, called hereafter FHLCS J1714.9+4210. The basic data are summarized in Table 1. There is no entry in the SIMBAD database or in the IRAS FSC at this position. An independent identification of this star with an FHLCS has been announced by Kurtanidze & Nikolashvili (2000) who identified it with the entry #3801 in the Second edition of the General Catalogue of Cool Carbon Stars (Stephenson 1989).

Table 1: Basic data for FHLCS J1714.9+4210

R.A. = (J2000.0)	17 ^h 14 ^m 57 ^s .5
DEC =	+42° 10' 22".9
= <i>l</i>	67°
= <i>b</i>	35°
= <i>V</i>	16 ^m .1
= <i>U</i> – <i>B</i>	> 1 ^m .5
= <i>B</i> – <i>V</i>	2 ^m .6
= <i>V</i> – <i>R</i>	1 ^m .0
= $\mu_{\alpha} \cos \delta$	–1.2 ± 1.6 mas yr ^{–1}
= μ_{δ}	+0.1 ± 1.2 mas yr ^{–1}

A low-dispersion spectrum (Fig. 1) was obtained in July 1998 with CAFOS at the 2.2-m telescope of the German–Spanish Astronomical Centre on Calar Alto, equipped with a *B*-400 grism and a SITe1d CCD. Reduction and wavelength calibration of the spectra were done in a standard fashion using the MIDAS package. The spectrum with a resolution of 20 Å shows pronounced C₂ and CN bands and weak or absent atomic hydrogen lines. A second spectrum, taken two years later, shows only little variations of the overall picture. With its strong carbon bands and a sharp bandhead of C₂ at λ 6181, FHLCS J1714.9+4210 resembles stars which have been identified as dwarf carbon stars (dCs) due to their large proper motions; according to Green et al. (1992), these

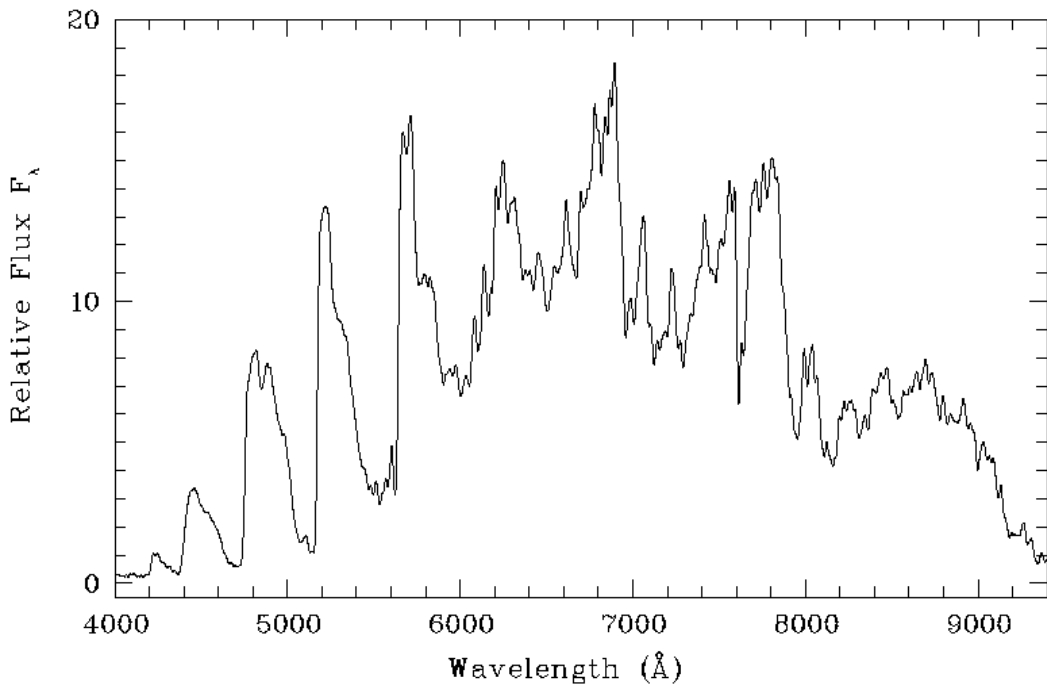


Figure 1. Low-dispersion spectrum (not flux-calibrated) of FHLCS J1714.9+4210

features are indicative of dCs rather than of giants. FHLCS J1714.9+4210 is probably an counter-example as it does not show a significant proper motion (see below).

The long-term B -band light-curve (Fig. 2) was obtained from the photometric reduction of 117 digitised Tautenburg Schmidt plates with limiting magnitudes $B_{\text{lim}} = 19\text{--}21$ taken between 1964 to 1997. The plates were calibrated by means of published sequences of standard stars around M 92. Typical photometric errors on a single plate are $0^{\text{m}}1$ to $0^{\text{m}}2$ for the measured magnitude range. FHLCS J1714.9+4210 is found to be variable on a significance level larger than 99.99%. Although the sampling of the photometric data does not allow to study the structure of the light-curve in detail, strong fluctuations on short time-scales as well as long-term trends are clearly indicated. A period of 0.81 yr is indicated by Fourier technique on a significance level of 94%. On the other hand, the structure function analysis (e.g., Simonetti et al. 1995) provides no clear-cut evidence for any periodicity.

The colour indices given in Table 1 are based on the measurements on plates from the epoch 1968 ± 2 . No colour-corrections have been applied since the Tautenburg colour system closely matches the Johnson system.

The absolute proper motion derived from the astrometric reduction of the B plates, which cover a baseline of more than three decades, is unverifiably low (Table 1). For comparison, the components of the mean absolute proper motion of the field stars are $(-3.4 \pm 0.1, -4.3 \pm 0.1) \text{ mas yr}^{-1}$ with a mean total proper motion of $\mu = 6 \text{ mas yr}^{-1}$. The reference frame is defined by 534 unambiguously identified and well-measured galaxies. The possibility that FHLCS J1714.9+4210 is a nearby dwarf having by chance such a small proper motion can be rejected on a significance level larger than 98%. The result of a zero-proper motion therefore suggests a giant star in the halo rather than a nearby dC. The galactic position of FHLCS J1714.9+4210, i.e. the galactocentric distance R and the height z above the galactic plane, are estimated to $(R, z) = (12 \text{ kpc}, 6 \text{ kpc})$ if $M_v = 1$ (see

Wallerstein & Knapp 1998), but may be as large as (67 kpc, 40 kpc) if this star is at the tip of the AGB.

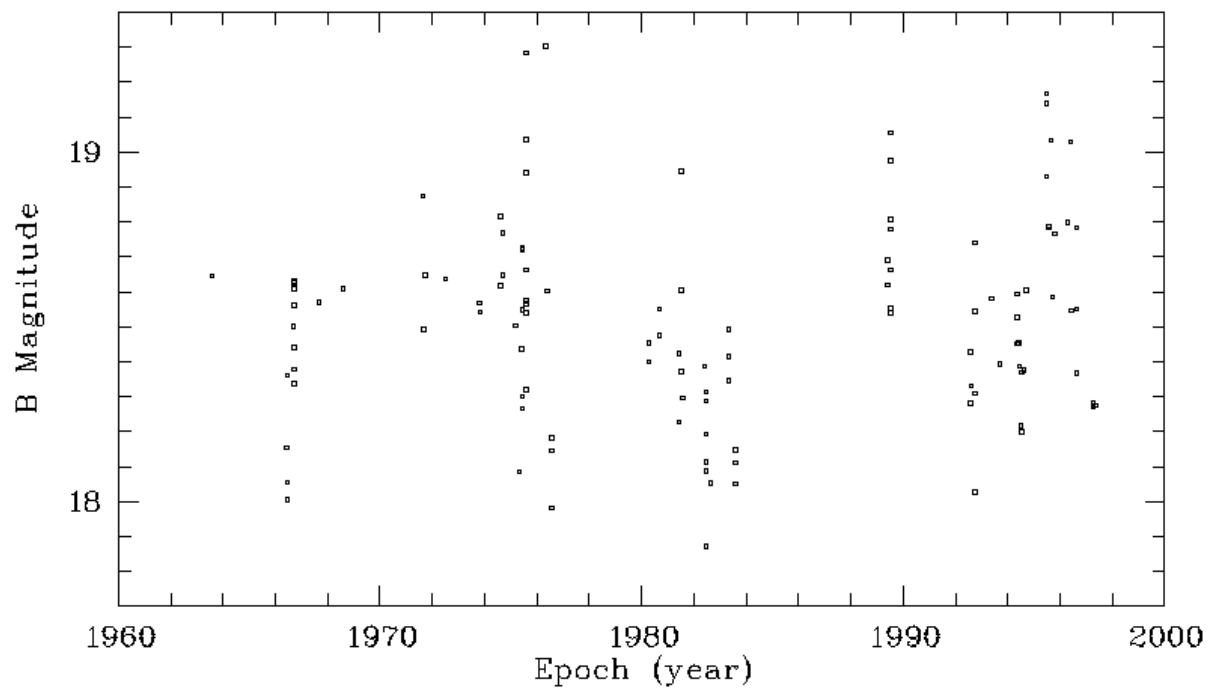


Figure 2. Long-term *B*-band lightcurve of FHLCS J1714.9+4210

References:

- Brunzendorf, J., Meusinger, H., 2001, *A&A*, submitted
Green, P.J., Margon, B., Anderson, S.F., 1992, *ApJ*, **400**, 659
Kurtanidze, O.M., Nikolashvili, M.G., 2000, *IAU Symp.*, **177**, 554
Simonetti, J.H., Cordes, J.M., Heeschen, D.S., 1985, *ApJ*, **296**, 46
Stephenson, C.B., 1989, *Publ. of the Warner and Swasey Observatory*, **3**, No. 2
Wallerstein, G., Knapp, G.R., 1998, *ARA&A*, **36**, 369