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OBSERVATIONS OF THE FLARE STAR V 1929 CYGNI

V1929 Cyg was discovered during the monitoring campaign for flare star search based on the photographic patrol observations with the Asiago 60/92 cm Schmidt telescope in the region of the NGC 7000 nebula. This star with coordinates R.A. (1950.0) = $20^h55\overset{m}{.}8$, Dec. (1950.0) = 43°46' got first designation A5 (Rosino et al., 1987). According to the 69th Name list of Variable Stars (Kholopov et al., 1989) the star is named V1929 Cygni. During the flare event on September 4, 1972 the star increased its brightness up to $14\overset{m}{.}5$ (pg). V1929 Cyg is obviously located near the V521 Cyg (LkHα 188) group of Hα-emission and flare stars in the star-forming region of the dark nebula "Gulf of Mexico" in the North America nebula. In Figure 1 the identification map of the star from an 8 minute exposed V-plate (Kodak 103aD+GG495) obtained with the 100/131 cm Byurakan Schmidt telescope on April 24, 1974 is given.

Here we present results of spectroscopic and photometric observations of V1929 Cyg in quiescence.

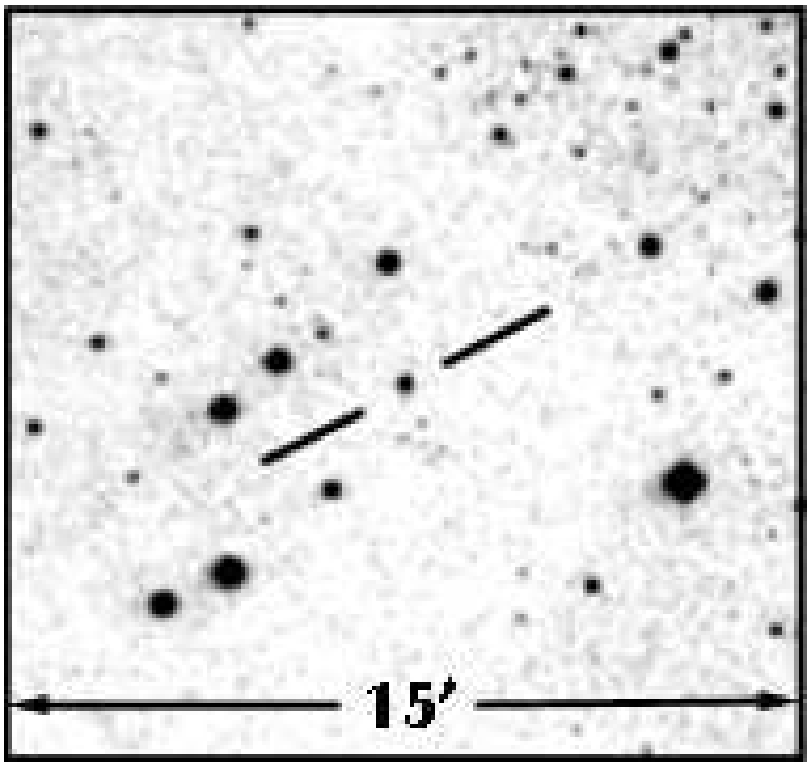

Figure 1. The identification map of V1929 Cyg. North is up, east is to the left

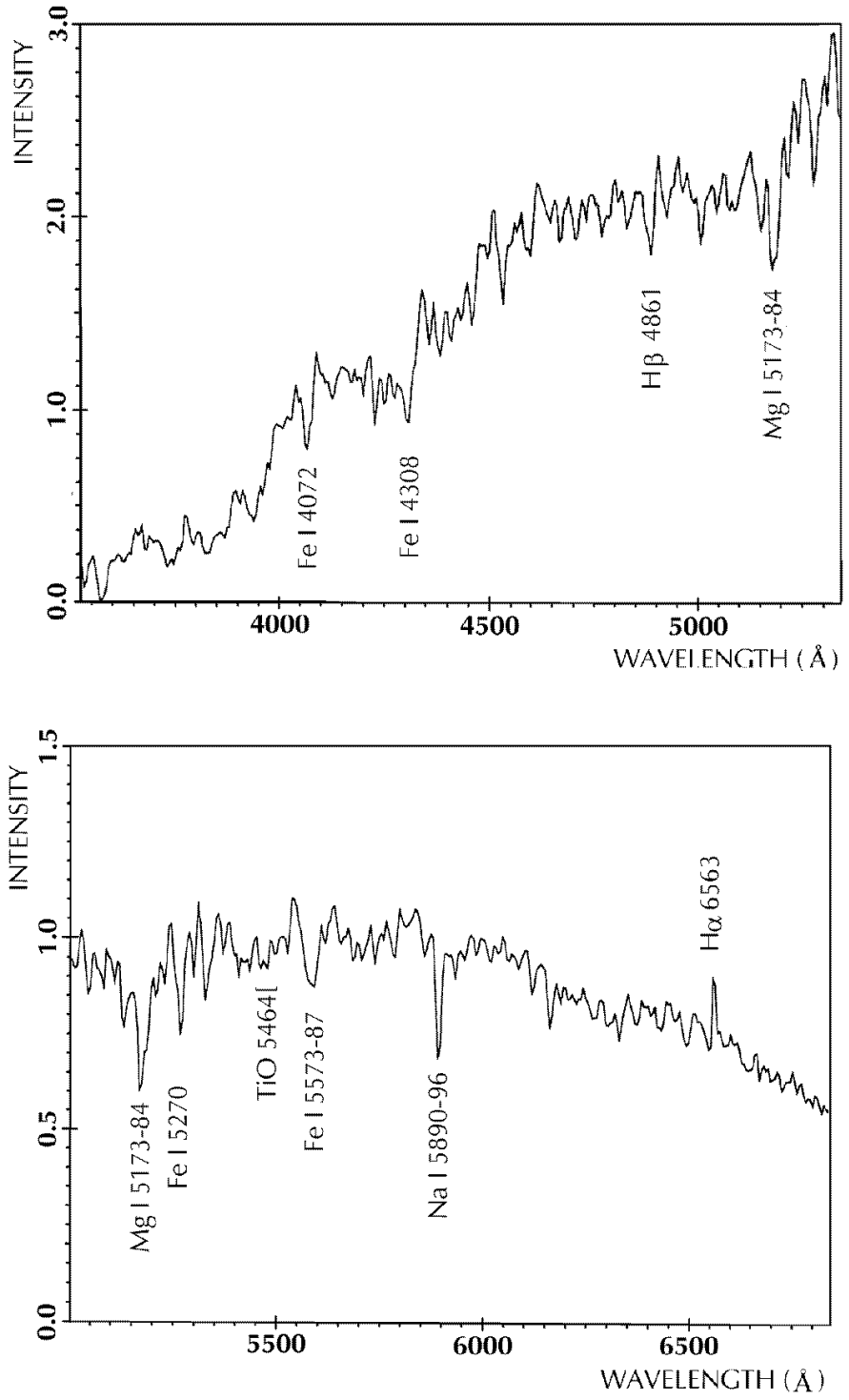

Figure 2. The spectra of the flare star V1929 Cyg in the blue (top) and red (bottom)

Here we present results of spectroscopic and photometric observations of V1929 Cyg in quiescence.

The spectroscopic observations were made with the 6-m telescope of the Special Astrophysical Observatory of the Russian Academy of Sciences and the 1000-channel television spectrophotometer scanner with SP-124 spectrograph (Drabek et al. 1985) during the night of October 15, 1988. The 600 lines/mm diffraction grating with effective resolution of about 5 Å was used. The standardization of the spectra by observing a well known standard star following the work of Bares and Hayes (1984) was done. A preliminary analysis of the spectra (subtraction of the sky background, correction for inhomogeneities in the photocathode sensitivity, construction of dispersion curves, and linearization of the wavelength scale was carried out according to Somov (1985). Further analysis of the spectra – correction for spectral sensitivity of the system, smoothing by means of gaussians, calculations of physical parameters, was done using the Byurakan Astronomical Data Analysing system (ADA – Zaratsyan and Maghakyan 1985). The observed two flare star spectra cover the visible region of the spectrum 3500-6800 A. In Figure 2 the spectra of V1929 Cygni in the blue and red spectral ranges are shown.

The CCD photometric observations were made in the Rozhen Observatory of the Institute of Astronomy, Bulgarian Academy of Sciences with the 2-m RCC telescope and ST-6 CCD camera on November 25, 1995. A series of two 120-sec exposures in B and V and 60-sec exposures in R and I (Kron) was obtained. The photometric reductions were made with a software package according to Georgiev et al. (1994) with the WFPDB computer complex. The magnitudes and colours of the star derived from the photometric BVRI observations after the extinction corrections are:

$$V = 15\overset{m}{.}24;\ B-V = 0\overset{m}{.}92;\ V-R = 0\overset{m}{.}64;\ V-I = 1\overset{m}{.}28.$$

According to this data V1929 Cyg is one of the brightest flare stars in the field of NCG 7000 nebula.

V1929 Cyg is included neither in the list of IRAS point sources nor in X-ray (ROSAT) catalogue. This fact could be due to the faintness of the star and does not exclude the respective requirements for registration in these catalogues.

The spectroscopic observations suggest that the star is of spectral type dK2-dK5 (with Hα-line in emission) having in mind the strong relation of the TiO 5464 spectral band with the spectral type of the stars of spectral classes dK2-dM2 (Pritchet and van den Bergh 1977, Pettersen and Hawley 1987).

The photometric values indicate estimation of the spectral class dK2e according to Zombeck's (1990) standard colours $B-V = 0\overset{m}{.}92$, $V-R = 0\overset{m}{.}74$ and $V-I = 1\overset{m}{.}22$ for stars of dK2 spectral type. Using the data for absolute magnitudes and colours for dK2 stars we obtained a distance modulus of $(m-M)_v = 8\overset{m}{.}64$. The maximum distance to V1929 Cyg would be 540 pc with the assumption for lack of interstellar absorption. As the average value of A_v for some near situated Hα-emission stars (like LkHα 189) is estimated by Cohen and Kuhi (1979) to be about $1\overset{m}{.}0$ we derived about 33 pc for the distance to the flare star. Taking into account that the distance to the NGC 7000 aggregate is 630 pc (Tsvetkov, 1976) we conclude that V1929 Cyg belongs to the nearest part of this star-forming region.

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