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THE YELLOW SYMBIOTIC STAR GH GEM

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Abstract. We have begun in 2005 a tight spectroscopic and $UBVR_CI_C$ photometric monitoring of the poorly known symbiotic star GH Gem. Its absorption continuum is that of a K3 III metal poor, low reddening giant, showing only weak, low ionization emission lines, with strong profile modulation. The long-term photometric evolution in V band is dominated by a marked periodicity at 331.774 day and $\Delta V = 0.8$ mag amplitude, while a sinusoidal $\Delta B = 0.6$ mag and $P \approx 72.5$ variability modulate the brightness at shorter wavelengths.

Key words: stars: binaries: symbiotic – stars: individual (GH Gem)

GH Gem (α= 07 04 12.78, δ=+12 03 34.3, J2000) has been so far among the less studied symbiotic stars. No one paper or individual note or communication to conferences has been devoted to it. Even the IUE satellite, so prolific on symbiotic stars, never observed it.

GH Gem was discovered by Hoffmeister (1944), who reported $12.5 \leq m_{pg} \leq 15.5$ as the variability range. It was considered as belonging to the RW Aur sub-class of T Tau stars (Glass & Penston 1974) and it was also classified as a F2 high galactic latitude blue variable (Bond 1978). Its association with symbiotic stars by Kenyon (1986) did not triggered major attention from professionals, but had the merit to bring it to the attention of amateurs which soon started to collect an abundant and regular mass of data.

Since fall of 2005 we are carrying out an intensive photometric and spectroscopic monitoring of GH Gem as part of the ANS (Asiago Novae and Symbiotic stars) Collaboration. Spectra are collected with the 1.82 m and 1.22 m telescopes operated in Asiago by the INAF Astronomical Observatory of Padova and the Department of Astronomy, University of Padova, respectively. $UBVR_CI_C$ CCD photometry is obtained with various telescopes belonging to ARAR (Bastia RA), Osservatorio P. Pizzinato (Bologna), GAPC (Zugna UD), Museo Civico di Rovereto (TN) and other private observatories in Como and Trieste. All photometric observations are accurately placed on the same $UBVR_CI_C$ comparison sequence published by Henden & Munari (2001).

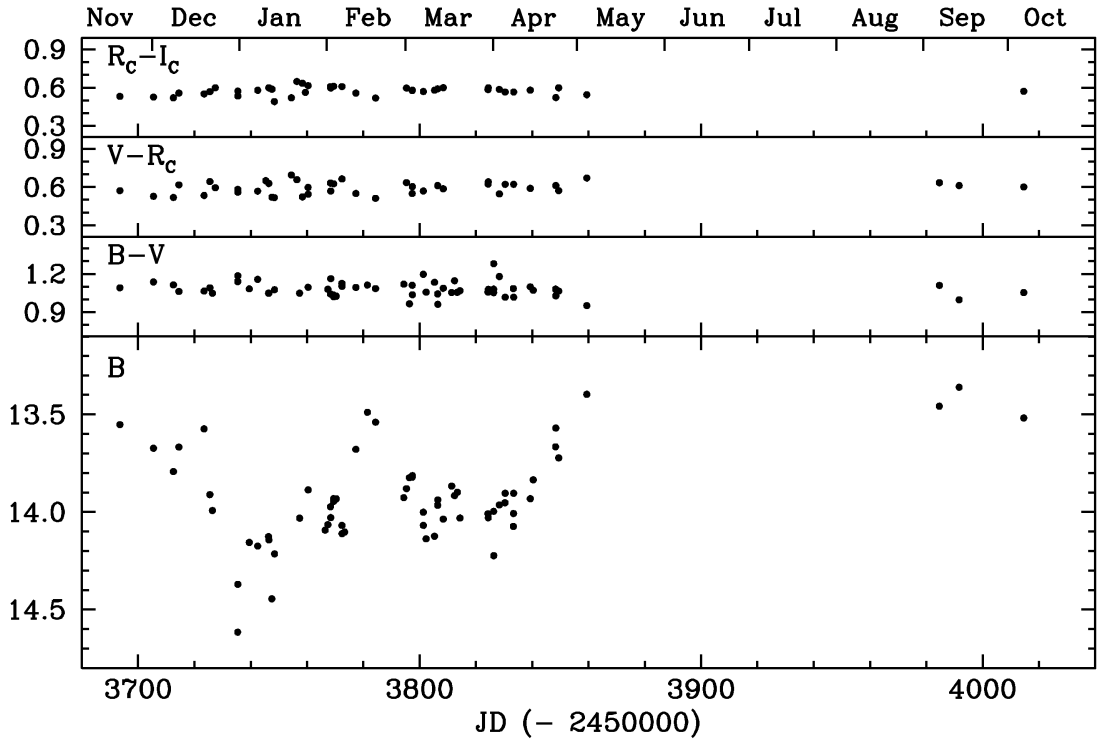

Fig. 1. Light- and color-curves of GH Gem from our 2005–2006 observations.

The BVR_CI_C photometric evolution during the last year (fall 2005 – fall 2006) is shown in Figure 1. The major feature is a $\Delta B \sim 0.6$ mag modulation. When combined with results from 11 blue plates from the archives of the Asiago 67/92 cm Schmidt telescope covering the years 1967–1981, the B band CCD data indicate a well shaped sinusoidal variability with a 72.5 d periodicity (cf. Figure 2, right panel). The $B \approx 14.6$ mag minima occurred on 1971 January 24, 1981 January 6 and 2005 December 31. Fourier analysis of 2314 visual estimates collected by AAVSO, VSNET and VSOLJ provides a clean and strong peak at 331.774 d. The phase-averaged corresponding light curve is presented in Figure 2 (left panel). The nature of these two distinct periodicities has not yet been firmly established and it will be subject to further intensive photometric monitoring during the 2006–2007 observing season.

The optical low resolution spectrum of GH Gem is presented in Figure 3. Its absorption continuum is that of a K3 III metal poor, low reddening giant. This is confirmed by the comparison in Figure 3 with the spectrum of HD 64960, an MK standard for the K3 III spectral type, which shares the metallicity of the solar neighborhood. GH Gem shows only weak, low ionization emission lines, with Hα displaying a strong, multi-component profile modulation. Note in Figure 3 the higher flux at bluer wavelengths due to the combined presence of the hot companion and emission from the ionized circumstellar gas.

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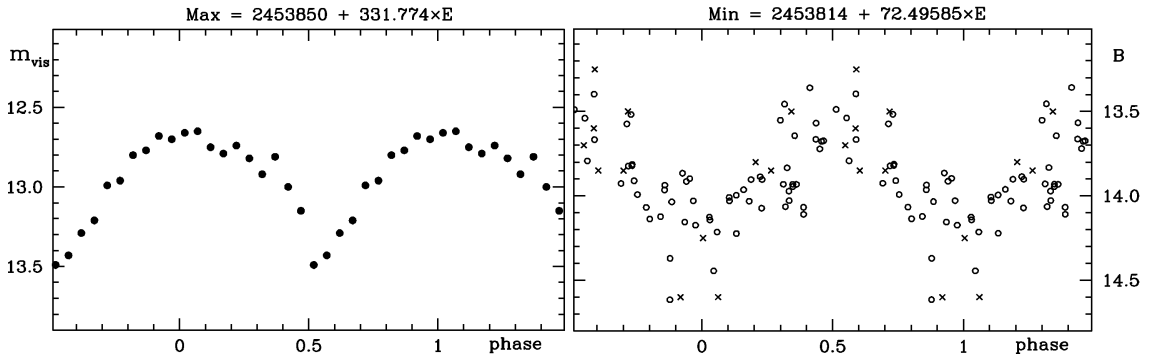

Fig. 2. Left panel: the phase-averaged light curve (bin width = 0.05 × period) of GH Gem from the visual estimates collected by AAVSO, VSNET and VSOLJ over the interval 1985–2005. Right panel: the phase plot of our CCD B-band data in Figure 1 (open circles) and photographic B-band data from 11 plates (exposed between 1967 and 1981) from the archive of the Asiago Schmidt telescopes (crosses).

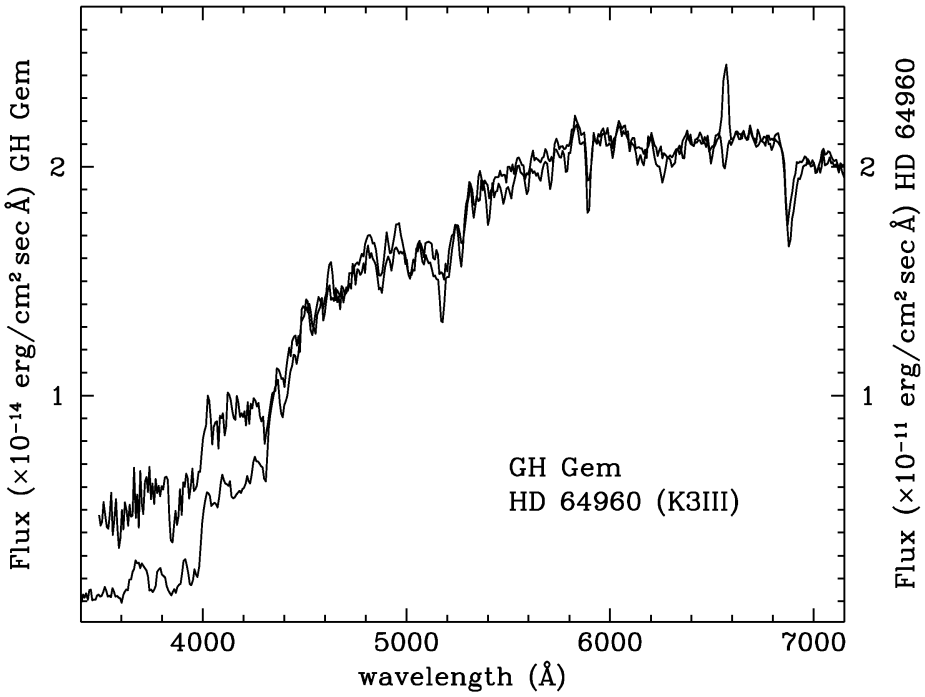

Fig. 3. A low resolution spectrum of GH Gem compared to that of HD 64960, an MK standard for the K3 III spectral type.

REFERENCES

Bond H. E. 1978, PASP, 90, 526
Glass I. S., Penston M. V. 1974, MNRAS, 167, 237
Henden A., Munari U. 2001, A&A, 372, 145
Hoffmeister C. 1944, AN, 274, 176
Kenyon S. J. 1986, *The Symbiotic Stars*, Cambdrige University Press