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CH CYGNI AND OTHER SYMBIOTIC STARS WITH LOW LUMINOSITY HOT COMPONENTS

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Some aspects of the recent activity period of the peculiar symbiotic binary CH Cyg, which has ejected both bipolar jets and discrete centrifugal outflows, are discussed.

In symbiotic binaries, the red giant's wind is accreted onto the white dwarf. High luminosity of the hot components ($L_{\rm hot} \sim 10^3 L_\odot$, reaching $\sim 10^4 L_\odot$ in the outbursts) (Mikołajewska 2003; Sokoloski 2003) indicates that the accreted matter undergoes thermonuclear burning. There are about 10 symbiotic stars which have ejected high-velocity, collimated, bipolar jets. Some of them show flickering of the optical light on the time scale of minutes. Both jet ejection and flickering indicate that an accretion disk should be present in those systems. Jet emitting symbiotic stars seem to have lower luminosity of the hot component ($\sim 1 - 100\ L_\odot$) than in most other symbiotics.

CH Cyg is a very peculiar object, starting to show symbiotic behaviour only in 1963. Since 1963, there have been intermittent active and inactive periods in its light curve. In the present poster, we have shown some preliminary results of recent spectroscopic and photometric observations of CH Cyg, carried out in Tartu (Estonia) and Piwnice (Poland) observatories. The most recent period of high activity was observed in 1998–1999, with U brightness rising to about 8th magnitude. In 1998, the Balmer emission lines had almost symmetric double-peaked profiles for some time, indicating their possible origin in a rotating (accretion) disk. Starting from late 1998, the lines were more asymmetric and rapidly variable. Highly variable absorption components of Hβ at velocities more than $-3000\,{\rm km s^{-1}}$ were observed in April 1999. Similar variations during one night were observed in the Hα profile between March 13 and 14, 1999. There are many other examples of rapid changes between a few nights only. Most of them occurred in the blue wing of the Balmer lines.

The most natural explanation to those rapidly varying emission and/or absorption features are discrete blobs of matter ejected by the hot component – centrifugal outflows. Such features of the Balmer lines were only observed during 1992–1995 (Tomov et al. 1996; Leedjärv & Mikołajewski 1995) and 1998–1999, i.e., before and after the jet ejection in 1997. No such spectral features are known from the time of the previous jet episode in 1984.

Thus, besides jets, perpendicular to the orbital plane, there are discrete outflows in or close to the orbital plane. In addition to CH Cyg, such outflows were detected only in RS Oph (Iijima et al. 1994). One more candidate for this type of activity, MWC 560, is oriented face-on, and possible centrifugal outflows do not produce significant changes in the emission line profiles. As there are very different symbiotic stars among the jet sources, jets seem to be relatively easy to produce. Careful monitoring could reveal more symbiotic stars with jets and also with the above mentioned centrifugal outflows.

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