MASS OF WHITE DWARF IN T CRB AND VARIABILITY OF ACCRETION DISK

R. ZAMANOV, P. MARZIANI
INAF, Osservatorio Astronomico di Padova,
Vicolo dell'Osservatorio 5, I-35122 Padova, Italy

V. STANISHEV
Institute of Astronomy, 72 Tsarigradsko Shouse Blvd., 1784 Sofia, Bulgaria

AND

N. TOMOV
National Astronomical Observatory Rozhen, POBox 136, 4700 Smolyan, Bulgaria

T Coronae Borealis is a well known interacting binary with orbital period of 227 d. This object fits into three classes of interacting binaries - cataclysmic variables, symbiotic stars as well as recurrent novae. T CrB can be therefore an important clue toward our understanding of the physical processes in interacting binaries [1].

T CrB was observed during 64 nights with the 2.0m RCC telescope of the Bulgarian National Astronomical Observatory Rozhen, between February 1993 and September 2001. Typically, the spectra cover about 100 Å centered at Hα with dispersion 0.2 Å/pix and S/N$\sim$ 30 − 100.

The Hα emission is thought to originate in an accretion disk around the hot component. However, at λ6562 Å, the main continuum contribution comes from the red giant. Because of this, the Hα profile is strongly affected by the absorption lines from the M giant. For the first time the Hα emission is investigated after subtraction of the red giant contribution.

The analysis of the radial velocities show that the mass of the hot component lies below the Chandrasekhar limit for $i > 63^0$, which is in good agreement with the other studies where i has been found to be between 60^0 and 68^0 ([2, 3]). The masses of the components are estimated to be $M_{WD} = 1.34\, M_\odot$, and $M_{gM} = 1.14\, M_\odot$ with an inclination $i = 65^0$, and binary separation $a = 212 R_\odot$. On the basis of radial velocity measurements we confirm that the hot component is a white dwarf.

D. de Martino et al. (eds.), White Dwarfs, 353–354.

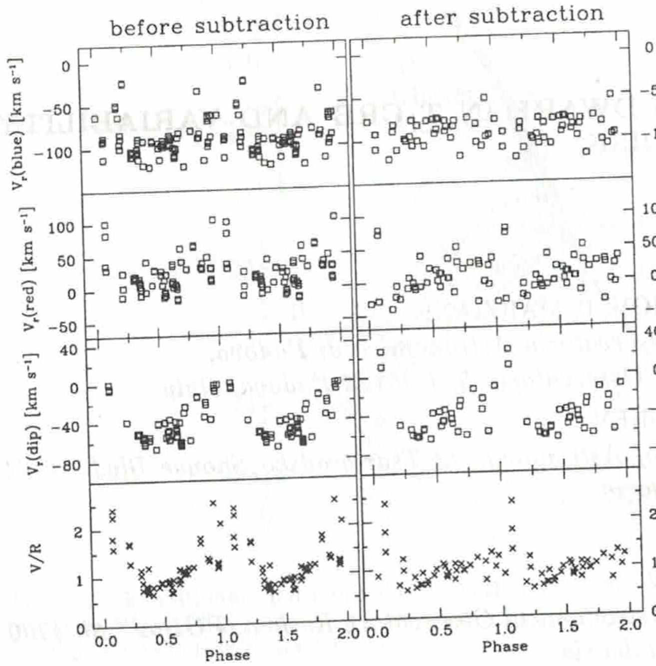

Figure 1. The emission line parameters before (left panels) and after (right panels) subtraction of the red giant contribution. From upper to lower are plotted the radial velocity of the blue hump V_r(blue), red hump V_r(red), central dip V_r(dip), and the peak ratio (V/R) of the blue and red humps. Note that V/R< 1 for phases 0.25 – 0.50, and V/R> 1 for 0.6 – 1.0. This indicates that the disk is not symmetric and more emission is coming from the side where we suspect the hot spot.

The size of the disk (R_{out}) producing the Hα emission can be estimated from the distance between the line peaks. Assuming Keplerian disk we obtain that it varies in the range $R_{out} = 23 - 170\, R_\odot$. However the distance from the center of the primary to the inner Lagrangian point is $R_{L1} = 110 R_\odot$. It means that the disk achieves values $R_{out} \approx 1.5 R_{L1}$. The implied size of the disk present problems. It may be that: 1) the disk enshrouds the entire system during the high state or 2) we are observing some material above and below the disk plane producing a false decrease of the peak separation. Further details will be reported in Stanishev et al. (in prep.)

References

1. Zamanov R. & Bruch A., 1998, A&A 338, 988.
2. Hric L., Petrik K., Urban Z., Niarchos P., Anupama G.C., 1998, A&A 339, 449.
3. Belczynski K., Mikolajewska J., 1998, MNRAS 296, 77.

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