HST UV OBSERVATIONS OF THE DISK AND WIND OF V795 HER

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Abstract. HST UV observations of V795 Her reveal a strong 2.6-h orbital variation in the prominent UV lines, in contrast to earlier (IUE) evidence of a 4.8-h period. Only the C IV line contains a strong blue-shifted, wind formed absorption component. Several lines exhibit a 'narrow' absorption feature near rest velocity which may originate in the disk, and a blue-shifted emission feature which accounts for most of the line profile variability.

1. Introduction

Previous UV (IUE) observations of V795 Her found that the strengths and profiles of the C IV and Si IV UV resonance lines were modulated on a probable period of 4.8 h, rather than the 2.6-h binary period [1,2,3]. To examine this phenomenon further, we obtained high time-resolution HST UV spectra of V795 Her which have yielded important new results.

2. Observations and results

V795 Her was observed by HST in 1994 June using the Faint Object Spectrograph (FOS + G130H grating) in rapid mode (Δt=20 s). We obtained 1450 spectra covering the 1150...1600 Å range at $\approx$1 Å resolution.

A key result is that in the HST data, all the strong UV line fluxes vary on the 2.6-h binary period. There is no sign of the previously witnessed 4.8-h period [2,3]. The continuum is not varying on either period. The line profile variability is concentrated over about 40% of the cycle and is manifested by broadening and deepening of each profile around phase 0.75 on the

A. Evans and J. H. Wood (eds.), Cataclysmic Variables and Related Objects, 43–44.
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ephemeris of [4]. The C IV line profile can be decomposed into (i) a broad, asymmetric, blue-shifted absorption trough, (ii) a *blue-shifted* emission peak and (iii) a narrower absorption core near rest velocity. The Si IV doublet, and indeed other measurable lines, appears to contain the latter two components but not the broad trough. We estimate the FWHM of the 'narrow' absorption component in the Si IV doublet to be $\sim$2000 km s^{-1}. The phase-resolved analysis supports this conclusion and suggests that changes in the emission peak alone can account for most of the variability between phase 0.6 and 1.0.

3. Discussion and conclusions

Whilst the apparently different behaviour of V795 Her during these HST observations (cf. our earlier IUE data) is perplexing, the orbitally related variability seen here does at least place the star back amongst the more conventional wind-driving nova-like systems. However, two key new results emerge from these high quality data. Firstly, several lines show a 'narrow' absorption feature. The breadth of this feature, its relative constancy, and the fact that it is located near rest velocity are consistent with an origin in the inner accretion disk. A simple comparison with stellar atmosphere models suggests the Si IV absorption doublet may arise in gas at about 21 000 K, the C IV feature in slightly hotter material. Secondly, the line profile variability around phase 0.75 arises principally from the disappearance and reappearance of the emission peak. This component appears to exhibit low amplitude ($\sim$100 km s^{-1}) *orbital* radial velocity excursions about a centroid that is blue-shifted by about 500 km s^{-1}. This apparent net blue-shift excludes association with the receding volume of any wind outflow. Similarly, it can not readily be ascribed to emission on the disk, for example a disk bright spot. A possible origin for this emission feature remains to be established. Finally, these data confirm that, apart perhaps from C III λ1176, only C IV contains the blue-shifted, extended (presumably wind-formed) absorption trough.

This new view of the line profiles in V795 Her may have important consequences for our understanding of the line behaviour in similar systems.

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