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Time-resolved *HST* UV echelle spectroscopy of IX Vel

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1. Introduction

In the hydrodynamical line-driven disk wind models of Proga, Stone, & Drew (1998) the mass loss rate is a strong function of the local luminosity. Also, the outflow is found to be subject to clumping, where the main source of driving radiation is the accretion disk. In order to test these predictions, we have obtained high resolution UV spectroscopy of the brightest novalike variable, IX Vel. These data have allowed us to examine the line profile structure in unprecedented detail.

2. The data

Observations were performed with the *HST*/STIS instrument in time-tag mode, equipped with the E140M echelle grating and the $0.1 \times 0.03''$ aperture. Three observations were made at intervals of several months to sample secular variation in the continuum flux level.

Figure 1 shows the time-averaged Lyα, NVλ1240 and CIVλ1549 lines from each observation, corrected for radial velocity shifts calculated from data given by Beuermann & Thomas (1990). We note variation in the continuum flux level – the average flux in the range 1260–1270Å is 11.7×10^{-12} on 3rd April, 6.1×10^{-12} on 30th May and 8.9×10^{-12} on 19th August (all flux units are erg cm^{-2}s^{-1}Å^{-1}).

Between the first and second *HST* visits there is little change in the general character of the spectrum. The lines display marked asymmetry with absorption extending bluewards of $\sim 3000\,\mathrm{km\,s^{-1}}$, even in Ly$\alpha$. Redshifted emission is also present in CIVλ1549 - we are seeing the signatures of a well-developed wind. However, in the third observation the line profiles are much weaker (CIV) and symmetrical (Lyα and NV).

In visit 1 we note narrow ($\Delta v \sim 100\,\mathrm{km\,s^{-1}}$) absorption features at about $-900\,\mathrm{km\,s^{-1}}$ superposed on the NV and CIV lines. These features show a slight motion that may follow the orbital motion of the white dwarf. It is interesting to note that these features accompany the period of most well-developed P Cygni activity and are not seen in the other two observations.

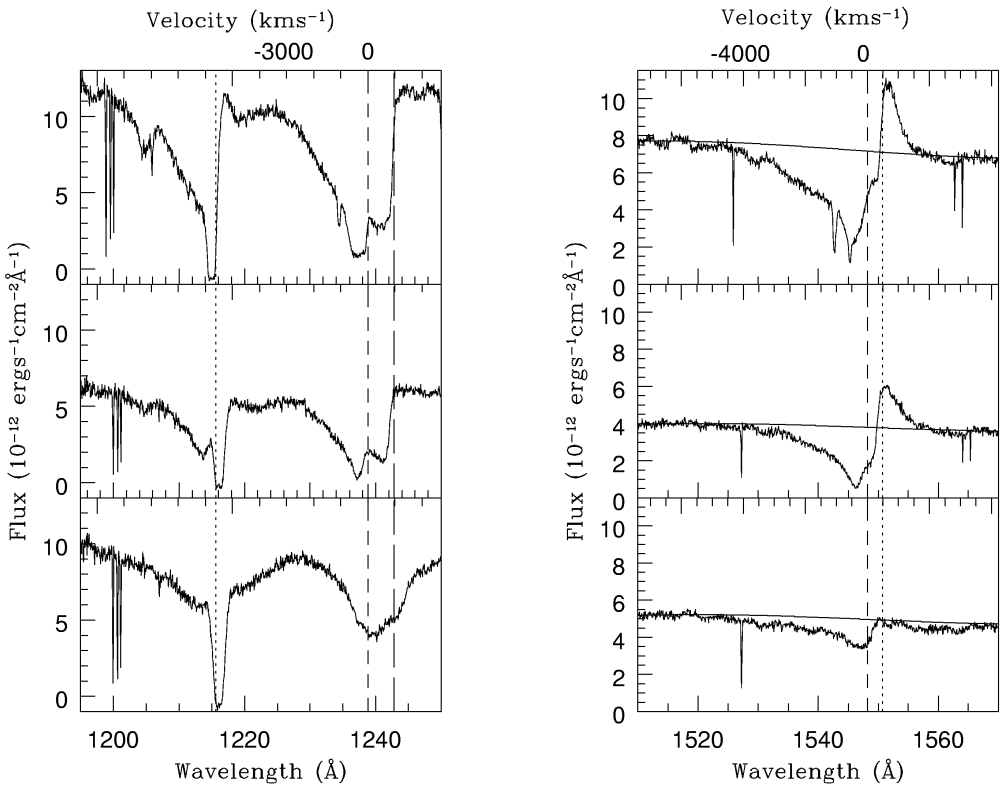

Figure 1. The time-averaged Lyα, NVλ1240 and CIVλ1549 recorded on, from top to bottom, 3rd April (visit 1), 30th May (visit 2) and 19th August (visit 3). A local continuum fit has been made to the CIV line to highlight the changing equivalent width.

3. Conclusions

We have observed IX Vel at three epochs. During one of these we have recorded a period of severely diminished wind activity. On re-examination of archive *IUE* spectra for evidence of similarly weak wind episodes, we have found several observations that record very weak CIV blueshifted absorption. The data of the third *HST* visit are therefore not peculiar. Our re-examination of the *IUE* database also indicates that there is no correlation between wind strength and UV flux level. This suggests that radiation driving is not the primary determinant of the mass loss rate.

The wind in IX Vel appears to be remarkably steady on the flow timescale of a few 10s of seconds – we see no evidence of clumping in the observed wind-formed line profiles.

References

Beuermann, K. & Thomas, H.-C. 1990, A&A, 230, 326

Proga, D., Stone, J., Drew, J.E. 1998, MNRAS, 295, 595