

## Emission LINE ANALYSES OF HBV 475, V1016 CYG, AND HM SGE

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ABSTRACT. Results of the high dispersion spectroscopic observations on HBV 475, V1016 Cyg, and HM Sge are presented. Due to yearly observations of HBV 475 since 1981, radial velocities which have been measured from H $\alpha$  and H $\gamma$  can be explained by a bipolar like non-spherical flow combined with the rotation. Highly resolved profiles of H $\alpha$ , [FeVII] $\lambda$ 6087, [OIII] $\lambda$  $\lambda$ 4959,5007, and HeII $\lambda$ 4686 are obtained from V1016 Cyg and HM Sge as well as HBV 475. Characteristic differences of them can be seen among these symbiotic stars.

### 1. Time Variation of Emission Line Profiles in HBV 475

Line profiles of H $\alpha$  and H $\gamma$  are displayed in Fig. 1a,b and radial velocities of them are plotted in Fig. 2 superimposed on the previous result (solid circles; Iijima et al 1981). To explain our results (open circles and squares, crosses, asterisks which correspond to H $\gamma$ , H $\alpha$  at FWHM, components of H $\alpha$ , H $\alpha$  at broad wings respectively), we introduce a bipolar like non-spherical flow combined with the rotation (indicated by real and broken lines). During these observations we noticed other characteristics on the strength and profile of HeI $\lambda$ 5016 line. It is available to explain this strength based upon the optical depth effect in absorption of  $\lambda$ 537. The title of preprint is "Spectroscopic investigation of HBV 475 in optical regions". This work will be published elsewhere.

### 2. Gaussian fitting analyses on the dynamical structure of ionized regions of HBV 475, V1016 Cyg, and HM Sge

Calibrated profiles of H $\alpha$ , [FeVII] $\lambda$ 6087, [OIII] $\lambda$ 5007, and HeII $\lambda$ 4686 of HBV 475, V1016 Cyg, and HM Sge are presented in Fig. 3a,b,c. It seems that almost all of these lines are consisted of several components which show different velocities among observed ions. This fact suggests various ionization stratification. A full paper is in preparation.

### Reference

Iijima, T., Mammano, A., and Margoni, R. 1981, *Ap. and Space Sci.*, **75**, 237

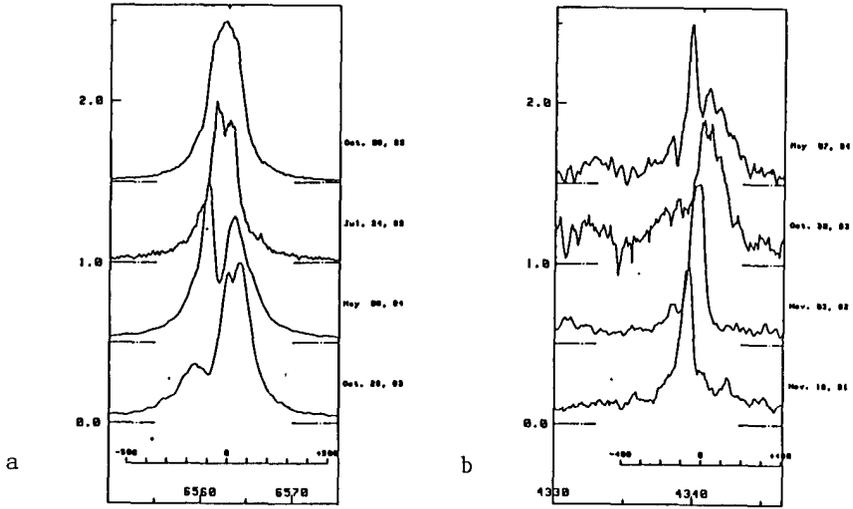


Figure 1. Time variations of line profiles in H $\alpha$ (a) and H $\gamma$ (b). Abscissae are wavelengths and velocities in the heliocentric system.

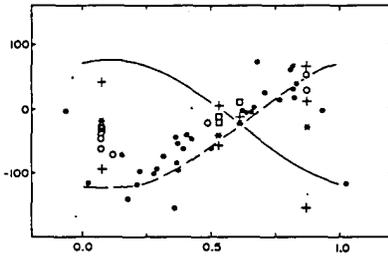


Figure 2. Observed radial velocities versus assumed phase in the binary hypothesis.

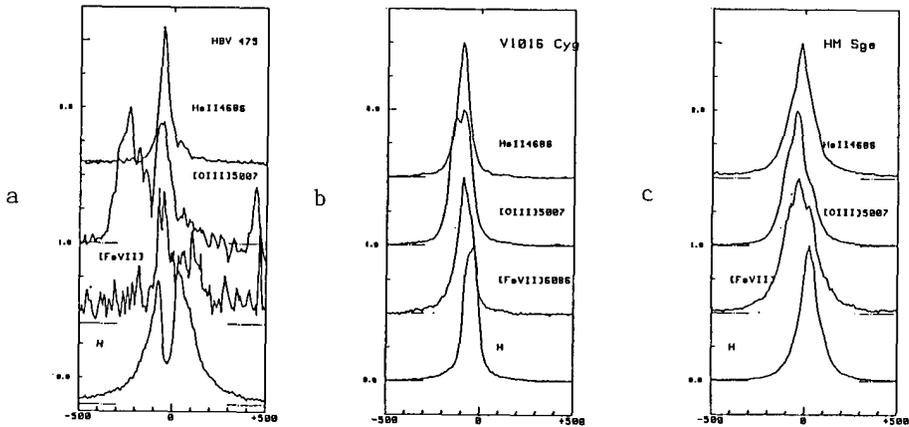


Figure 3. Emission line profiles of HBV 475(a), V1016 Cyg(b), and HM Sge(c). Abscissae are velocities in the heliocentric system.