

A NEW TYPE OF ASYMMETRIC OUTFLOW IN THE RECURRENT NOVA RS OPH IN QUIESCENCE

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Abstract. H I emission lines in the spectrum of the recurrent nova and symbiotic star RS Oph in quiescence are sometimes accompanied by blue- or red-shifted broad emission components. The displacements of the broad components from the narrow lines change from -1300 to $+1200$ km s $^{-1}$, but possibly not continuously. The broad components seem to appear in some restricted regions on the spectra. An asymmetry between the blue- and red-shifts is noticed.

RS Oph is a binary system consisting of a white dwarf and a mass-losing M type giant (e.g. Bruch 1986; Garcia 1986; Dobrzycka & Kenyon 1994). Recently, broad emission components of H I lines were found in some quiescent spectra, and their peculiar properties have been determined, e.g. they appear on the blue side of the narrow lines or on the red side, but not on both sides simultaneously; furthermore, their wavelengths, profiles, and intensities change with a time-scale of days (Iijima et al. 1994; hereafter Paper I). Here results of new observations in 1993 are reported. The criteria of the observations are the same as in Paper I. The broad components usually show double-peaked profiles. The last five columns of Table 1 give displacements of individual peaks of the broad components of H α and H β relative to the narrow lines and of the center wavelengths between the two peaks v_{cent} . As in Paper I, the more distant peak is called the primary peak. The observational error is about ± 30 km s $^{-1}$. A histogram of v_{cent} is shown in Fig. 1, where the results presented in Paper I are also included. Since there is a strong narrow emission line at the center, displacements less than ± 800 km s $^{-1}$ are not detectable. As seen in the figure, there are four prominent peaks in the histogram located at, from left to right, -1230 ± 25 , -1140 ± 15 , $+930 \pm 20$, and $+1020 \pm 20$ km s $^{-1}$. It seems that the broad components do not move continuously, but appear in these restricted

TABLE 1. Spectroscopic observations of RS Oph in 1993

Date	Exp. (m)	JD - 2 440 000	Spectral range (nm)	H α^p	H α^s	H β^p	H β^s	v_{cent}
July 28	20	9197.45	398 - 510			-1405	-733	-1069
July 28	5	9197.48	571 - 683	-1496	-1014			-1255
Aug. 13	20	9213.41	392 - 504			-1540	-769	-1155
Aug. 13	5	9213.45	580 - 692	-1514	-993			-1254
Aug. 14	20	9214.41	396 - 508			-1458	-843	-1150
Aug. 14	5	9214.45	574 - 686	-1508	-976			-1242

Exp.: Exposure time; p : primary peak, s : secondary peak, v_{cent} : mean of p and s

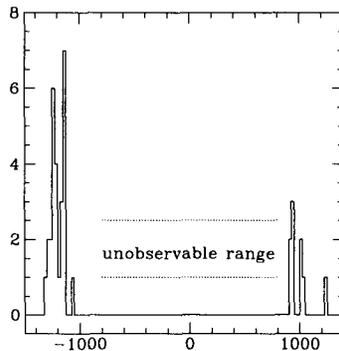


Figure 1. Histogram of radial velocities of the center of broad emission components. Horizontal scale in km s^{-1} .

regions. The lack of blue-shifts around -1000 km s^{-1} is noticeable. This result suggests that there is an asymmetry between the blue- and red-shifts, or the center of the symmetry is blue-shifted by about 100 km s^{-1} . It seems difficult to explain these asymmetric and discrete displacements with known models of bipolar gas outflow. There might be a new type of gas outflow in this system. Among numerous symbiotic stars only this object and CH Cyg (Paper I; Kuczawska, Mikolajewski & Kirejczyk 1992; Leedj r 1993) have similar broad emissions.

References

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