# SPECTROPHOTOMETRY OF THE Hα REGION IN HR 5110.

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Spectrophotometry of the bright RS CVn binary HR 5110 is presented. The data consist of 42 red spectrograms obtained with the DDO 74" telescope. All spectrograms were scanned using the PDS microdensitometer system at the DDO and rectified intensity tracings were produced.

Visual inspection of the plates reveals the occasional presence of Hα emission. The measures of the Hα absorption and emission equivalent width scatter between 4.9 and 2.4 Å. (For a standard Hα absorption line profile, the EW is 6.8Å). The EW is not correlated with orbital phase. Subtraction of a standard Hα absorption line profile ($T_e$ = 7500 K, log g = 4.0, Kurucz, 1979) reveals an asymmetric emission profile. The emission profile exhibits a blue asymmetry over 270° of the orbit and a red asymmetry over 90°. This suggests that there is a general outflow of material from the system, which is blocked during the phase interval when the red asymmetry occurs.

Assuming that there is one source of emission in the system, constraints may be placed on its location. I find that the emission source lies no more than 1.03 $R_{sec.}$ from the center of mass of the secondary star. It is not located on the line of centers of the system. An obvious interpretation is that this emission source is an active region associated with starspots. A stream interpretation seems to be ruled out in a simple one source model.

## Reference

Kurucz, R.: 1979, *Astrophys. J. Suppl.* 40, pp. 1-340.



*M. J. Plavec, D. M. Popper and R. K. Ulrich (eds.), Close Binary Stars: Observations and Interpretation, 413–414.*

DISCUSSION FOLLOWING FRAQUELLI

Feldman: Perhaps the "line source" of the Hα emission you describe can be accounted for as a rising Hα prominence, similar to what is found in the early stages of giant (Type IV) solar flares (reference: A.C. Riddle, Solar phys. 13, 448, 1970).

Fraquelli: I happen to have here the equivalent width data plotted against phase. You will notice that the radio flare data show no difference from the data obtained when I have no radio information. Either HR 5110 is active all the time, in which case you should have seen it frequently, or the radio flare has no effect on the Hα. Also, I have not shown any flare emission profiles. However there is no difference between flare and non-flare profiles. At the most, there might be a few percent difference, but I would have to wait until after the subtraction is redone before saying anything further.

Gregory: You showed both blue and red emission features with the red feature appearing as the blue feature disappeared. You argue that the blue feature is blocked but could you explain what gives rise to the red feature?

Fraquelli: The red feature is due to the material flowing away from the observer. You don't see this at phases 0.0 → .72 because the material is optically thick. If the secondary star was not blocking the emission source, you wouldn't see a red feature in the interval 0.72 → 0.0, but a blue one.

Zuiderwijk: I always feel a little uncomfortable about this type of extremely model-dependent analysis. Therefore, I would like to know if you are sure that you used the right radial velocity of the star to shift the theoretical spectra The shifting components you showed may easily be an artifact of a slightly wrong velocity correction.

Fraquelli: Yes, I am sure because the first time I did it, I did it wrong. The period is accurate in the seventh decimal place. In the ∿12 years since this period determination, the error in the period is not sufficient to produce the asymmetry shifts that I see. I appreciate your concern, as slight errors in the adopted velocity can significantly affect the central regions of the derived emission line profile.

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