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RAPID H α EMISSION VARIABILITY IN V711 TAURI (= HR 1099)

V711 Tau (HR 1099) is one of the few RS CVn binaries to show H α as a pure emission feature during radio-quiet intervals (Bopp and Talcott 1978). Typically, the quiescent equivalent width (EW) of H α is 0.5 - 1.0 Å, though there are significant night-to-night variations seen. We have previously reported (Weiler *et al.* 1978) H α to be strongly enhanced during radio flares: in September 1976 the emission EW increased to ~1.5 Å during a radio flare, and during the great radio flare of February 1978 (Feldman *et al.* 1978) a

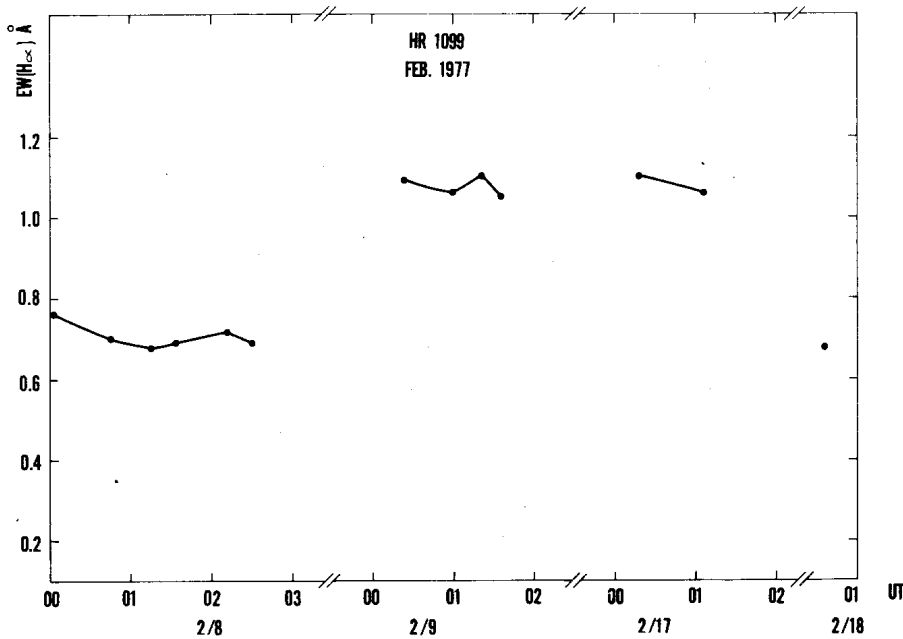


Figure 1: H α emission EW data for HR 1099 during a non-flare interval in February 1977.

peak $H\alpha$ EW of -3 \AA was seen (Popper 1978; Fraquelli 1978). We have also commented on the apparent presence of rapid (~ 10 - 15 minute) variations in $H\alpha$ EW of V711 Tau during radio flares. In this note, we present our data for the February 1978 flare graphically. The case for rapid variability at $H\alpha$ is strong, but we stress that additional measures, preferably by photoelectric scanner or Reticon, are desirable.

Figure 1 plots the $H\alpha$ EW versus time for a radio quiet interval in February 1977. The EW's were obtained from spectrograms (dispersion 40 \AA/mm , resolution $\sim 1.3 \text{ \AA}$) obtained with the 1 meter Ritter Observatory reflector and Cassegrain image-tube spectrograph. The sequence of spectrograms obtained on 8 February 1977 illustrates the typical scatter of our measures, about $\pm 10\%$ or less. Note that the next night shows $H\alpha$ as $\sim 50\%$ stronger, but no rapid variations are seen. The flare data of February 1978 (Figure 2) are quite different. On 21 and 22 February, when the 10.5 GHz flux was 500 - 600 mJy ,

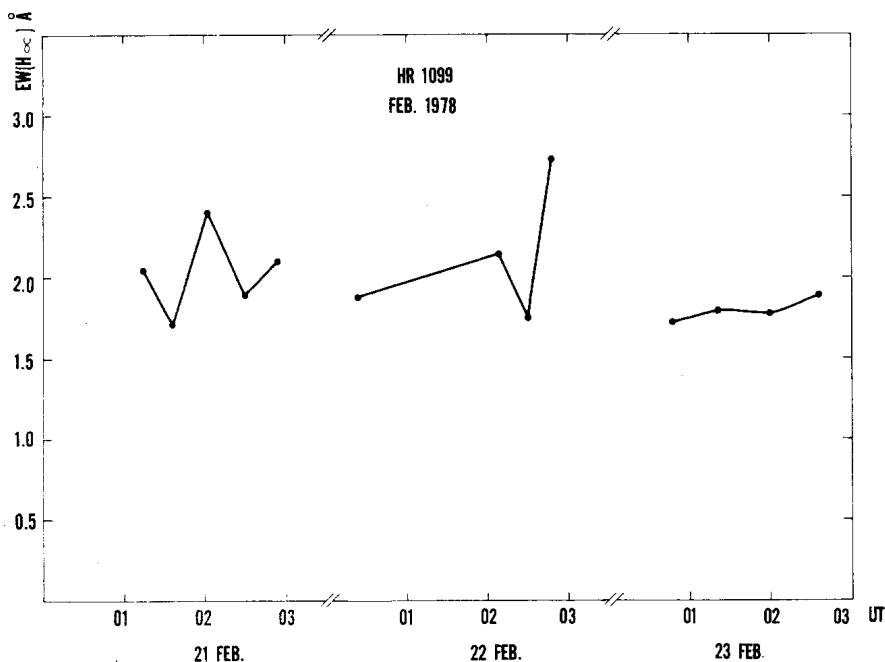


Figure 2: Same as Figure 1, during the radio-flare of February 1978.

the H α EW was strongly enhanced and variable by about 40%. On 23 February, when the radio flux had declined to 200-300 mJy, the H α EW was sensibly constant.

Since these H α variations were present only at certain phases of the radio outburst, we believe they represent real changes in the H α emitting region on a time-scale of 15 minutes or less. Certainly there is convincing evidence for variations in radio flux and polarization of V711 Tau on similar time-scales (Feldman *et al.* 1978; Brown and Crane 1978), though of course the emitting regions involved are quite different.

Though radio variations of ~20% were seen on 21 and 22 February, there is no correlation with the rapid H α variations. The only possible correlation is with diminished radio flux on 23 February, and the lack of variations in H α seen on that date.

The uncertainties in photographic spectrophotometry impose a limit on the precision of an EW measurement of ~10%. It would be quite useful to extend these observations using photoelectric techniques of greater precision; perhaps V711 Tau shows even non-flare H α emission variations at the few percent level. The high signal to noise Reticon data obtained by Tomkin (reported in Fraquelli 1978) show ~20% H α EW variations on 21 February 1978 between 3-4 hours UT, immediately after our observations.

The question of profile variability on short time-scales also requires further investigation. There is clear evidence of night-to-night profile changes (Hearnshaw 1978, Fraquelli 1978) but high-resolution spectroscopic observations with a time resolution of 10-15 minutes have not yet been obtained.

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References:

- Bopp, B.W., and Talcott, J.C., 1978, *Astron. J.* 83, 1517.
- Brown, R.L., and Crane, P.C. 1978, *Astron. J.* 83, 1504.
- Feldman, P.A., Taylor, A.R., Gregory, P.C., Seaquist, E.R., Balonek, T.J.,
and Cohen, N.L., 1978, *Astron. J.* 83, 1471.
- Fraquelli, D.A. 1978, *Astron. J.* 83, 1535.
- Hearnshaw, J.B., 1978, *Astron. J.* 83, 1531.
- Popper, D.M. 1978, *Astron. J.* 83, 1522.
- Weiler, E.J., Owen, F.N., Bopp, B.W., Schmitz, M., Hall, D.S., Fraquelli, D.A.,
Piirola, V., Ryle, M., and Gibson, D.M. 1978, *Astrophys. J.* 225, 919.