

IUE SPECTRA OF THE BY Dra/FLARE STAR AU Mic

C.J.Butler¹, A.D.Andrews¹, J.G.Doyle¹, P.B.Byrne¹, J.L.Linsky²,
T.Simon², N.Marstad², M.Rodonò³ and V.Pazzani³

¹ Armagh Observatory, Armagh, N.Ireland

² JILA/NBS, University of Colorado, Boulder, USA

³ Osservatorio Astrofisico and Università di Catania, Italy

A coordinated series of ground-based optical and IUE observations of BY Dra variables was undertaken to follow the spectral variation of these stars over one cycle. In the first series 20 LWR and 19 SWP trailed spectra were taken of AU Mic over a three day period 4-6 August 1980 .

In Figure 1 we show the mean integrated fluxes for the strong emission lines in the SWP spectra of AU Mic over the observed phase interval of 0.14 to 0.8 together with an approximate V light curve determined by the FES on IUE. From comparison of the emission line intensities and FES magnitudes in Figure 1 several points emerge.

(a) The light curve at this time had at least three and possibly four minima. If this is to be interpreted as due to rotation of a spotted star, several spotted regions would be required, distributed in stellar longitude.

(b) Repeated flaring of AU Mic makes it difficult to perceive any clearly defined modulation of the emission line intensities due to plage regions in the vicinity of the spots.

(c) Following flare activity during SWP 9695 and SWP 9698 it appears that the intensity of the HeII and SiII lines has remained high for some time after the drop in intensity of the CIV line.

In order to further investigate point (c) we have attempted to refine the time resolution of SWP 9694, 9695 and 9696 using the STAK and TRAK programs on STARLINK devised by Giddings and Settle (1980). With a time spacing of about 25 minutes a flare is evident in each of these spectra with optical flares coincident with the CIV peaks in SWP 9694 and 9696 observed by Barbier and by Touhy respectively (private communications). In Figure 2 it again appears that in all three of these spectra the lower excitation lines peak later than CIV by some tens of minutes. An even finer time resolution for SWP 9695 shown in Figure 3 indicates that in this, the largest of the three UV flares, the emission lines of CI, CII, SiII and HeII all peak around 20 minutes after CIV reaches its maximum intensity. This unexpected result may possibly be due to a high proportion of the CI, CII, SiII and HeII originating from irradiation by soft X-rays.

REFERENCE

Giddings, J. and Settle, J. (1980) SRC IUE Newsletter No 5,11.

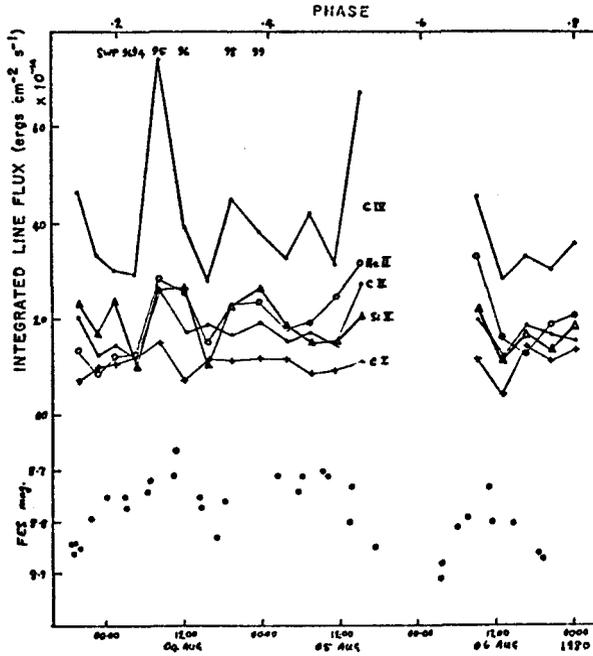


Figure 1. Top, Mean fluxes in strong UV emission lines of AU Mic Bottom, V magnitude of AU Mic determined from Fine Error Sensor

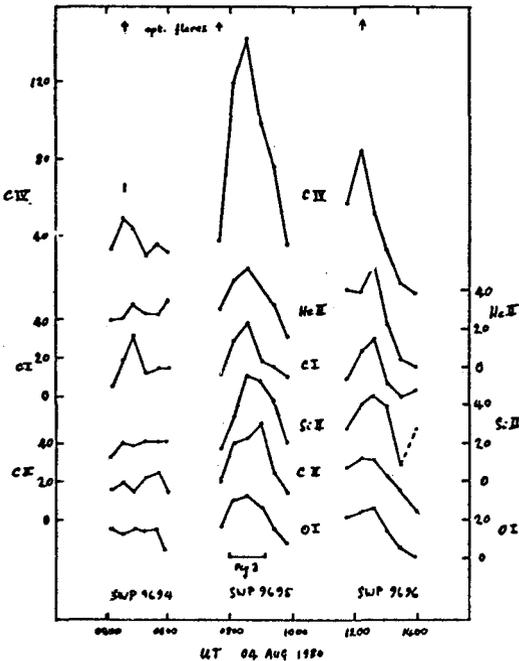


Figure 2. Fluxes of UV emission lines in SWP 9694, 9695 and 9696 with time resolution of approximately 25 mins.

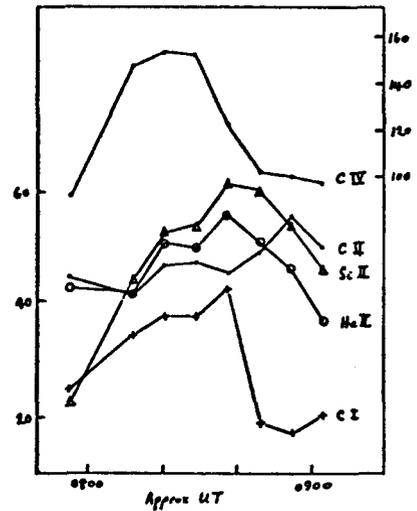


Figure 3. Emission line fluxes with time resolution of 8 mins approx. from SWP 9695.