

## THE ULTRAVIOLET SPECTRUM OF AG DRACONIS

A. Altamore<sup>1</sup>, G.B. Baratta<sup>1</sup>, A. Cassatella<sup>2</sup>, A. Giangrande<sup>3</sup>,  
D. Ponz<sup>2</sup>, O. Ricciardi<sup>3</sup>, R. Viotti<sup>3</sup>

1. Osservatorio Astronomico e Università di Roma, Italy

2. Astronomy Division ESTEC, Villafranca, Spain

3. Istituto Astrofisica Spaziale (CNR), Frascati, Italy

The high resolution ultraviolet spectrum of AG Dra was observed with IUE in April and August 1981 at phases 0.50 and 0.69 according to the Meinunger (1979, Inf. Bull. Var. Stars No.1611) U-light curve. The UV spectrum of the star appears rather different from that of the other classical symbiotic stars. The low resolution IUE spectrum of AG Dra shown in figure 1. The continuum is rather strong with respect to the emission lines and detectable at high resolution. Many intense interstellar lines are present, in spite of the low reddening of the star ( $E(B-V)=0.06$ , according to the depth of the 2200Å interstellar band).

The emission line spectrum has a high ionization temperature, showing permitted and intercombination lines of CIV, NIV-V, OIV-V, SV, SiIV, while CIII] and NIII] are very weak. OI and MgII are also present. The radial velocity difference, emission minus absorption lines is about  $-110 \text{ km s}^{-1}$ , in agreement with the optical observations. An electron density of  $\sim 3 \cdot 10^9 \text{ cm}^{-3}$  is derived from the OIV] lines. HeII  $\lambda 1640$  is very prominent in emission with broad wings. If this line is produced by photoionization by ultraviolet radiation, a  $100000^\circ\text{K}$  black-body temperature for the hot source is required.

We have compared the 1981 observations with the pre-outburst 1979 (phase 0.46) and 1980 (phase 0.90) IUE spectra. The continuum and the emission lines before outburst appeared much weaker than in 1981, and the 1979-80 variations are in agreement with the Meinunger light curve, suggesting that the whole UV spectrum of AG Dra before outburst is variable in phase with the U-curve.

In figure 2 we show the intensity variations of the emission lines during 1979-81, as compared with the visual light curve as derived from the AAVSO Circulars. This light variation was followed by most of the emission lines except SiIII] that was almost steady. For the high ionization lines, in spite of the large variations in intensity, there is an indication of no change in the relative intensities of the NV, CIV, SiIV

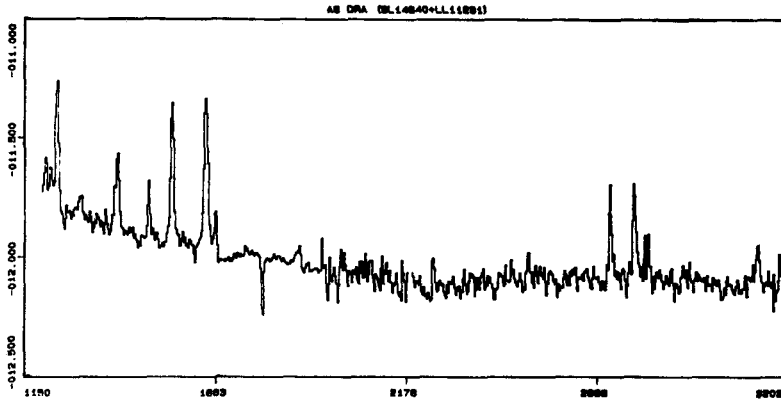


Figure 1 (Altamore et. al., facing page). The low resolution ultraviolet spectrum of AG Draconis after outburst, in August 1981. The most prominent emission lines are NV  $\lambda$  1240, CIV  $\lambda$  1550, HeII  $\lambda$  1640, HeII  $\lambda$  2732 and MgII  $\lambda$  2800. A weak continuum depression near 2200 Å is present. The line near 1900 Å is SiIII], while CIII]  $\lambda$  1909 is very weak.

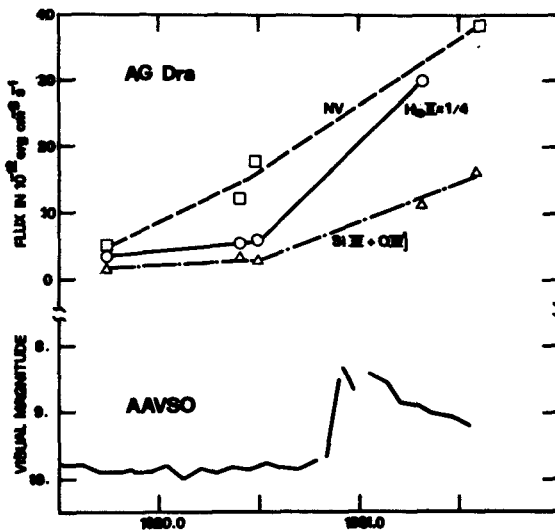


Figure 2. Spectral variations of AG Draconis during 1979-81 from high and low resolution IUE spectra. The visual light curve (from the AAVSO Circulars) is shown. The 1979 and 1980 data are referred to a U-light minimum and maximum respectively.

and OIV] lines which may indicate that the mean ionization level has not varied after the outburst.