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TWO IUE SPECTRA OF RY SCUTI

RY Sct (HD 169515,BD-12°5045) has been studied several times, but the spectroscopic evidence for this large mass system has been most recently summarized by Cowley and Hutchings (1976).

O'Connell (1949) has described a complex light curve derived from photographic estimates. Woodsworth and Hughes (1977) observed an apparently thermal radio spectrum for the binary; Geisel (1970) a (K-N) index greater than 0.5 mag; and Allen and Swings (1976) an (H-K)-excess of 0.40 mag.

Under program PG2SS, originated by S. Sobieski, RY Sct was observed in the low dispersion, large aperture mode with the spectrograph aboard IUE. The instrument is adequately described in the 5 October, 1978 issue of Nature. For a variety of reasons only two spectra were obtained but, because of the intrinsic interest of the binary, they are briefly described here. The circumstances of the spectra appear in Table I; the ephemeris by Cowley and Hutchings was used to calculate

Table I
Low Dispersion Spectra of RY Sct

Image	Hel.J.D.	Phase	Exposure	Remarks
LWR1493	2443643.229	0.004	45 min.	Weakly exposed for $\lambda<2400$Å and saturated for 2750Å$<\lambda<2950$Å.
SWP1543	2443643.258	0.006	19 min.	Very weak exposure

phase. The counts from the Fine Error Sensor on board the spacecraft give V = +9.59 and +9.68 for the LWR and SWP images, respectively. Comparison with the V magnitudes by Hilditch and Hill (1975) shows that

RY Sct was deeply in its primary minimum for both exposures. For both LWR1493 and SWP1543, the weak exposures are partly due to the large reddening while the interval of saturation on LWR1493 is due to the change in slope of the reddening law and to the dependence of the cathode sensitivity upon wavelength. In fact, for RY Sct it is impossible to obtain a properly exposed spectrum with a unique exposure over $1900\text{Å} < \lambda < 3200\text{Å}$.

Strömgren indices for RY Sct have been observed by Hilditch and Hill. Their $\underline{c}_1$-index shows considerable intrinsic scatter and the ($\underline{b}$-$\underline{y}$) reddening was derived from the ($\underline{b}$-$\underline{y}$, $\underline{u}$-$\underline{b}$) plane calibrated by Crawford (1975) and Crawford and Mandwewala (1976). The ($\underline{b}$-$\underline{y}$) reddening was transformed to $E(\underline{B}\text{-}\underline{V}) = 1.29$ through the relation given by Crawford and Mandwewala, the interstellar extinction law due to Jamar, et al. (1976) was assumed, and the cathode spectral responses were taken from IUE Newsletter No. 2. The dereddened spectra were faced against model atmospheres by Carbon and Gingerich (1969) and Auer and Mihalas (1972). In general, an atmosphere with $T_e = 40{,}000\text{K}$, $3.5 < \log g < 5$ describes the spectrum over the interval $1350\text{Å} < \lambda < 3300\text{Å}$ within the precision of the observations. A temperature less than 35000K will not represent the observations adequately, and RY Sct would, therefore, appear to be an O6 to O7 object by the temperature scale of Conti (1973). Such a classification is consistent with the dereddened Strömgren indices.

The temperature and inferred spectral type could be in error if a substantial part of the reddening is circumstellar, rather than interstellar. The small ($\underline{H}$-$\underline{K}$)-index noted by Allen and Swings, however, favors an interpretation based on free-free emission and not on thermal emission due to dust. Therefore, a difficulty remains: the IUE spectra were taken during the eclipse of the less massive, and presumably hotter, component, and it is remarkable that a temperature as hot as 40,000K would be found for an object usually classified as B0.

Although SWP1543 is a very weak exposure, it appears that the C IV λ1550 feature shows a P Cyg-type profile. It is also possible that shell features are present for Si IV λλ1394, 1402, OV λ1371, and N IV λ1719. However, N IV λλ1239, 1243 and O IV λλ1338, 1343 could not be detected. Except for λλ2307, 2733 which are obliterated by cathode reseaux, the 3-5 through 3-13 lines of He II may be weakly present in absorption. Other weak absorptions and emissions are also suspected, but the spectra are not really suitable for detailed study.

Obviously more spectra for RY Sct would be useful but no more observing time remains for PG2SS. For other interested observers, exposure times with the large aperture in the low dispersion mode at the same orbital phase would be of the order of 100 minutes for an SWP image, 25 minutes for 2750Å < λ < 2950Å, and 50 minutes for an LWR image to either side of the wavelength interval just noted.

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