

ON THE ABSOLUTE WAVELENGTH CALIBRATION : α ORI.

The spectrum of α Ori was exposed for 930 min with the SWP/ HI mode of the IUE during joint NASA/ESA shifts on 19 August 1981 (SWP 14775). The spectrum was recorded through the large aperture of the spectrograph.

The resulting wavelengths of identified and well exposed lines (see Figure 1) are given in Table I. When the radial velocity of the star (+21 km/s) is taken into account the lines are found to be blue shifted by $-0.131 \pm 0.015 \text{ \AA}$ ($-23.2 \pm 27 \text{ km/s}$). This would imply an outflow velocity at chromospheric level of about 20 km/s for α Ori.

This was a remarkable and quite surprising result, and we looked for possible instrumental causes for the measured shift. It was noted that a slight positioning error of the star within the large aperture would give rise to an apparent shift of the spectrum relative to the wavelength standard derived with the Pt-Ne calibration lamp. A positional error of the star within large aperture by 1 arcsec may lead to an error of the SWP/ HI wavelength scale by as much as 7 km/s.

A new spectrum of α Ori was obtained on 20 August 1982 (SWP 17725). This time we made the exposure through the small aperture of the spectrograph, and with an exposure time of 370 minutes. The stellar spectrum was followed immediately by a Ne-Pt lamp exposure.

The 20 August spectrum of α Ori is quite noisy as shown by Figure 2. Only five lines could be measured with confidence (Table 1). The average shift of the five lines was to the red and became $\lambda(\alpha \text{ Ori}) - \lambda(\text{lab}) = 0.015 \pm 0.053 \text{ \AA}$ ($2.4 \pm 8.3 \text{ km/s}$).

We selected 28 well exposed lines of the Ne II and 28 lines of Pt II ($\lambda\lambda$ 1400 - 1950 \AA) of the Ne-Pt lamp spectrum to check the adopted wavelength scale. The laboratory wavelengths are taken from Kelly and Palumbo (1973) and Turnrose and Bohlin (1981) respectively. From the Ne II line spectrum we derived $\lambda(\text{Ne-Pt lamp, IUE}) - \lambda(\text{lab}) = 0.005 \pm 0.013 \text{ \AA}$ ($0.8 \pm 2.1 \text{ km/s}$). In the case of Pt II we found corresponding relative shift $0.014 \pm 0.012 \text{ \AA}$ ($2.4 \pm 2.1 \text{ km/s}$).

We conclude that we observe no significant, relative wavelength displacement for the "chromospheric" lines of α Ori within the accuracy of the measurements.

The present observations of α Ori SWP/HI spectra have shown that when observing with the large aperture the wavelength scale may be off by as much as 25 km/s.

TABLE 1

Emission lines of α Ori observed with the IUE SWP/HI mode
 (1): Observations with large aperture on 19 August 1981
 (2): Observations with small aperture on 20 August 1982

λ (lab)	Line Ident	$\lambda(\alpha \text{ Ori}) - \lambda(\text{lab})$	
		(1)	(2)
1641.178A	O I	-0.127A	-
1785.272	Fe II	-0.147	-
1786.752	Fe II	-0.137	-
1787.996	Fe II	-0.142	-
1807.311	S I	-0.130	-
1820.342	S I	-0.123	+0.091
1826.245	S I	-0.109	-0.014
1900.286	S I	-0.159	-0.028
1914.698	S I	-0.113	-0.022
1993.620	C I	-0.125	+0.050

REFERENCES:

Kelly, R.L., Palumbo, L.J., 1973, "Atomic and Ionic Emission Lines below 2000 Angstrom", NRL Report 7599.

Turnrose, B.E., Bohlin, R.C., 1981, IUE NASA Newsletter No. 13.

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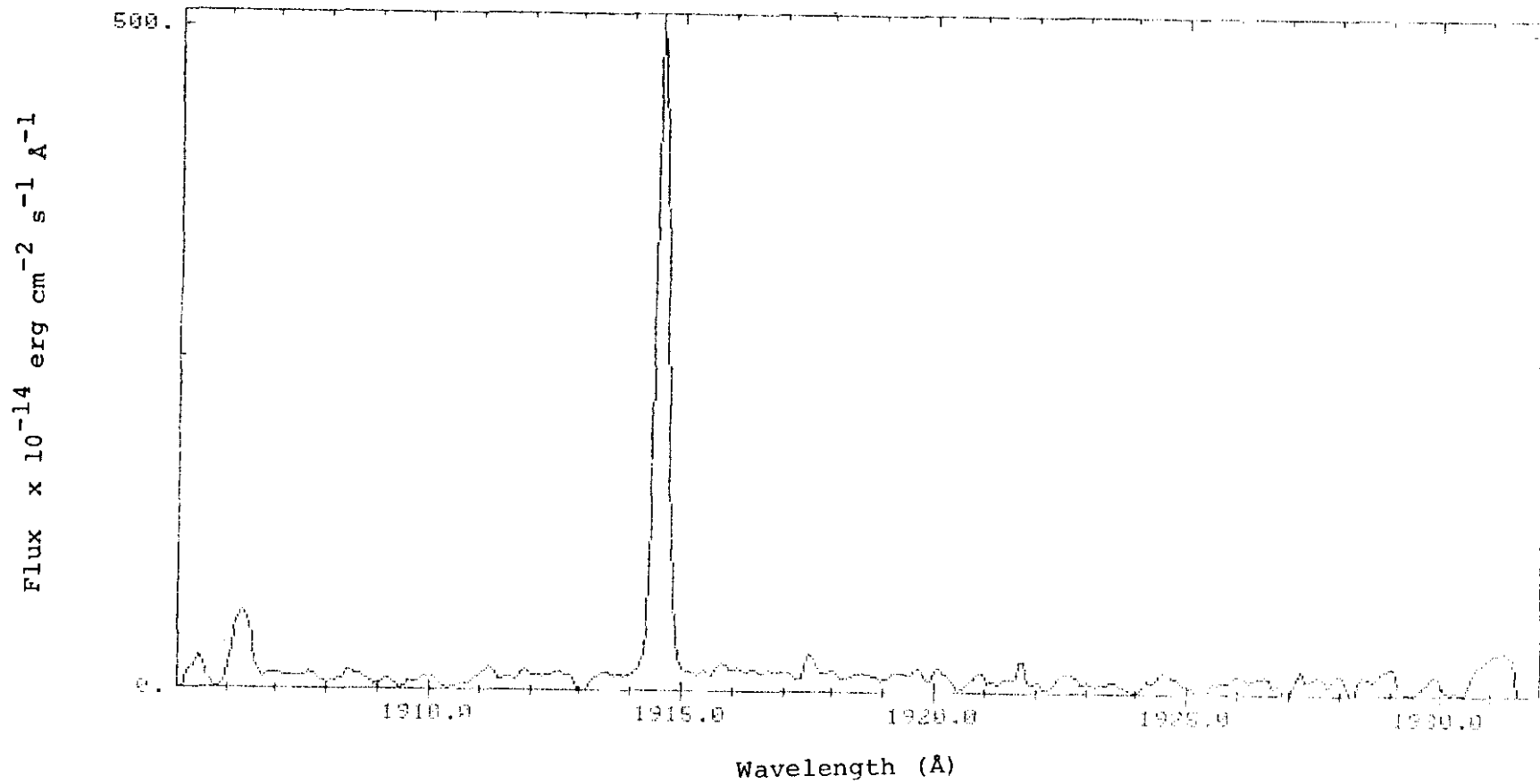


Figure 1 - α Ori observed with large aperture 19 August 1981
(SWP/HI order no. 72)

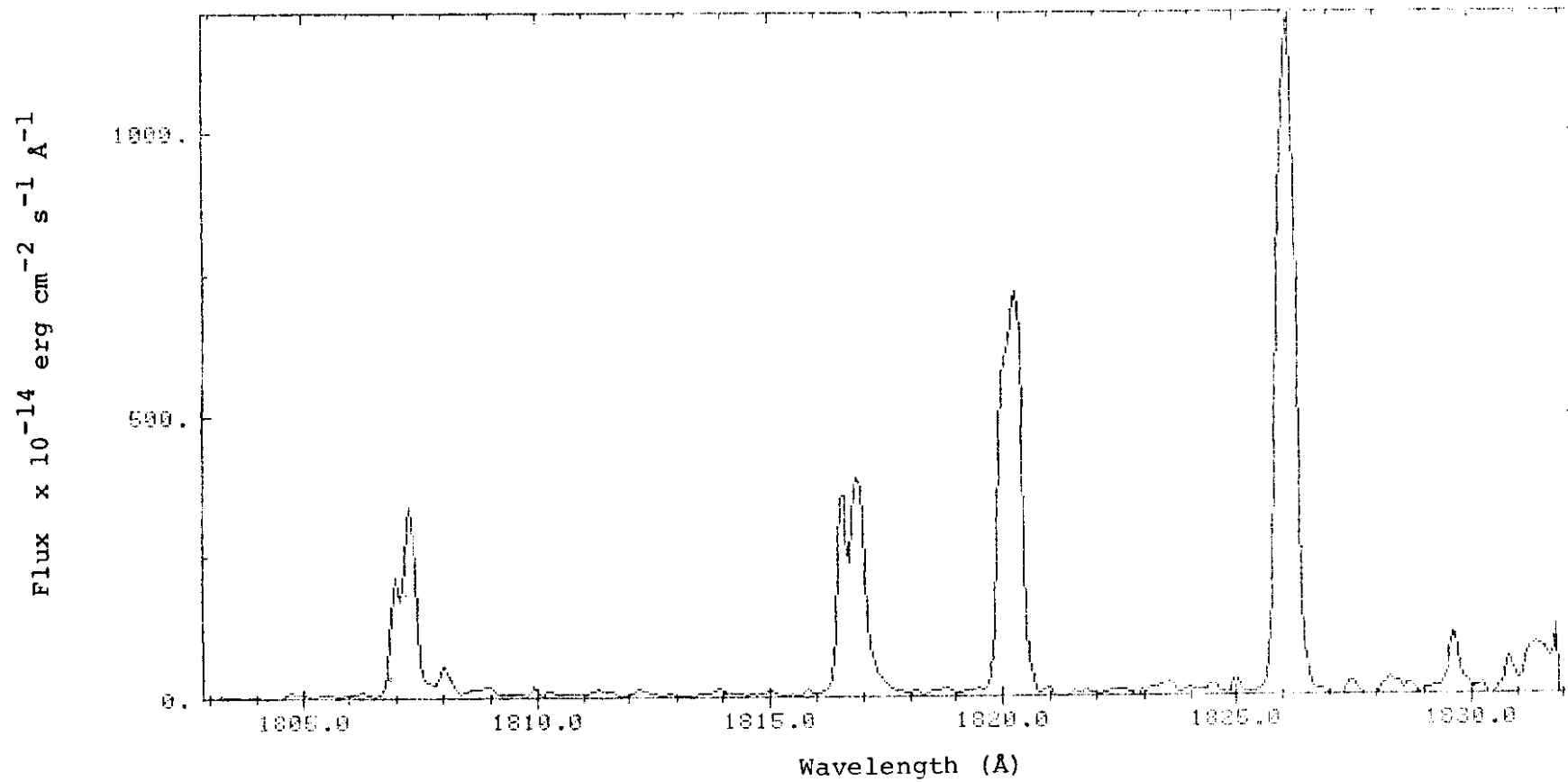


Figure 1 - α Ori observed with large aperture 19 August 1981
(SWP/HI order no. 76)

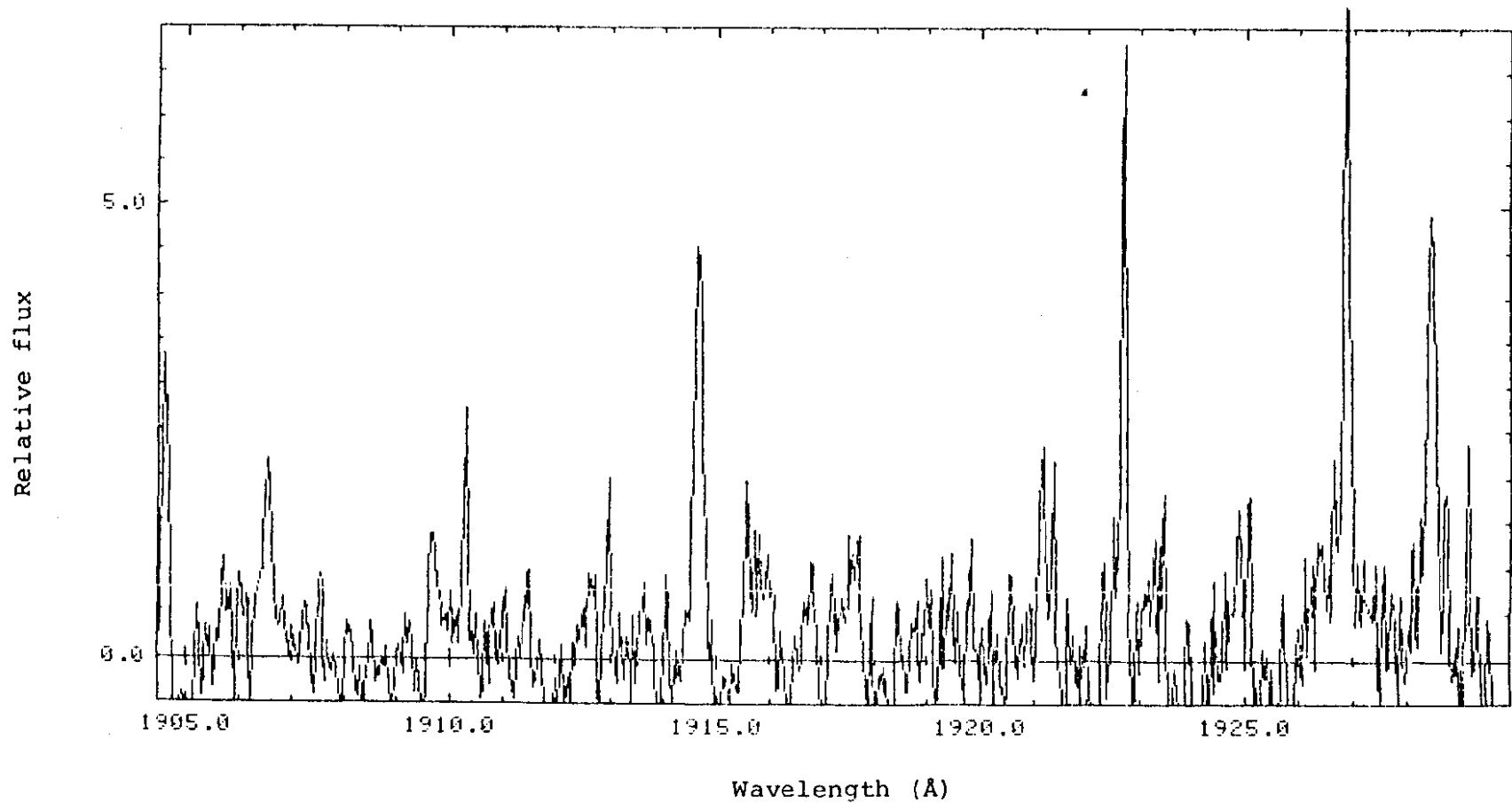


Figure 2 - α Ori observed with small aperture 20 August 1982
(SWP/HI order no. 72)

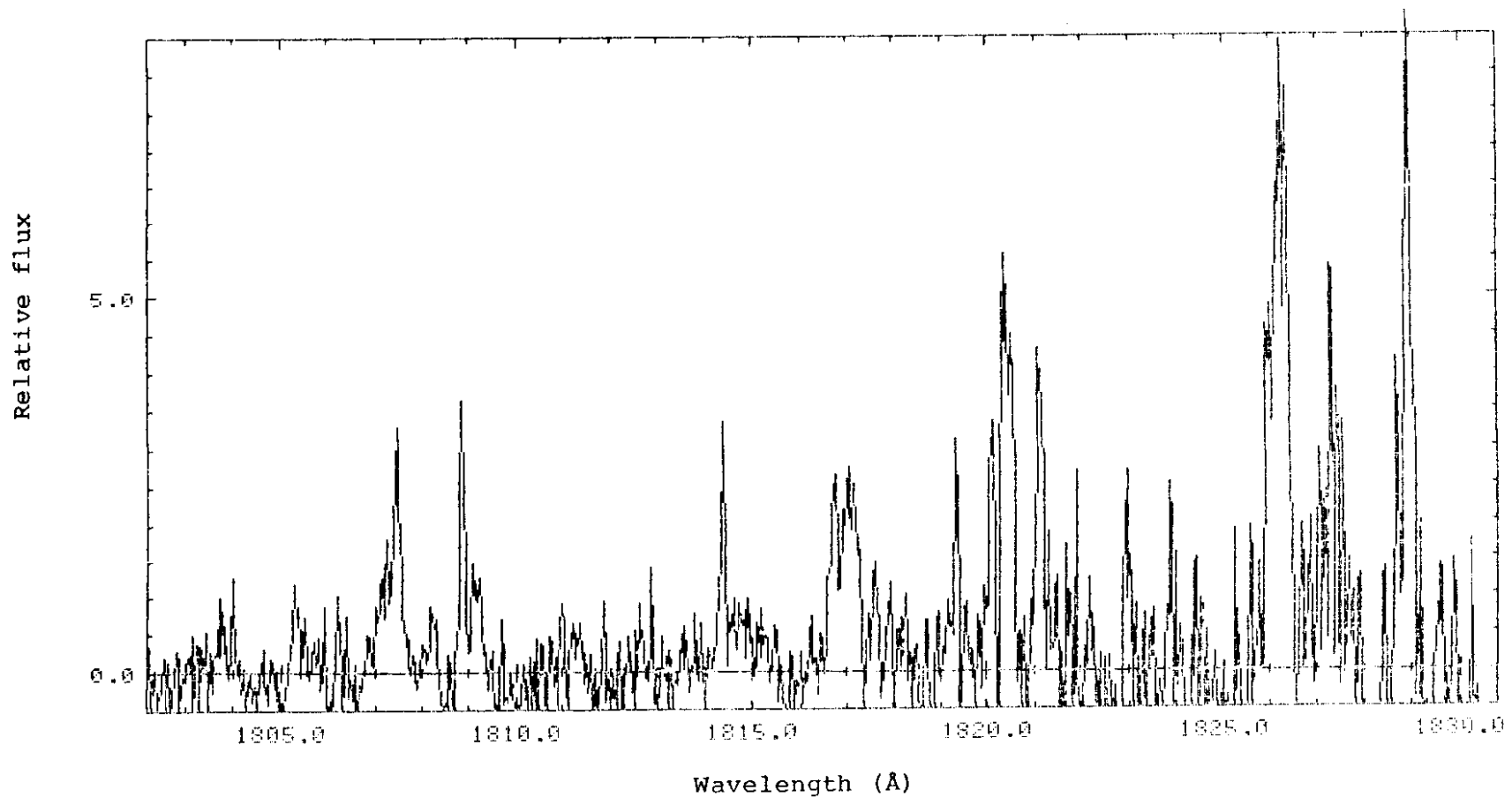


Figure 2 - α Ori observed with small aperture 20 August 1982
(SWP/HI order no. 76)