

Wolf-Rayet star spectra from 1150 Å to 1200 Å

Joy S. Nichols¹ and Jeffrey L. Linsky²

¹*Harvard-Smithsonian Center for Astrophysics,
 60 Garden Street, Cambridge, MA 02138, USA*

²*JILA, University of Colorado, Boulder, CO 80309, USA*

1. Atlas of FUV fluxes for Wolf-Rayet stars

The NEWSIPS-reprocessing of *IUE* data permits the extraction of spectra to wavelengths as short as 1150 Å. We present representative well-exposed *IUE* spectra of Wolf-Rayet stars covering the 1150–1220 Å region with a resolution of 0.1 Å. The C III 1175 Å line in WC and some WN stars typically shows a P-Cygni profile, with DACs apparent in time series spectra. Superimposed on the stellar spectra are many strong interstellar absorption lines of N I, Si II and other species. These spectra are a guide to a portion of the wavelength region to be covered by *FUSE*, and an indication of the new information that will be available in the far-UV range with *FUSE*.

2. Spectral features

The list below indicates some probable and possible line-identifications for the features identified in *IUE* WR star spectra, to be included in the Far UV Spectral Atlas. In addition to these, there are a number of unidentified features.

Table 1. Possible and probable line-identifications, and unidentified cases.

ion	wavelength (Å)	ion	wavelength (Å)
P II	1152.81	instrument artifact	1188
Fe VI	1154.1	S III	1190.206
	1164.211	Si II	1190.418
Ge II	1164.273		1193.284
Si III	1157–1162 (blend of 6 lines)	Si II *	1194.496
N I]	1159.817	N IV	1195.6
	1160.937		1197.389
Mn II	1162.017	Mn II	1197.172
	1163.325	S III	1197.5
Fe VI	1165.7	Mn II	1199.388
	1167.7		1201.118
N IV	1169.0	N I	1199.55
C IV + N IV blend	1169		1200.223
C III	1175.7 (blend of 7 lines)	Si III	1206.51
N III	1184		1200.710
	1185.5		

Figure 1a displays three NEWSIPS-spectra of WC stars. The most conspicuous feature in this region of the WC star spectra is C III at 1175 Å. C III is present as a

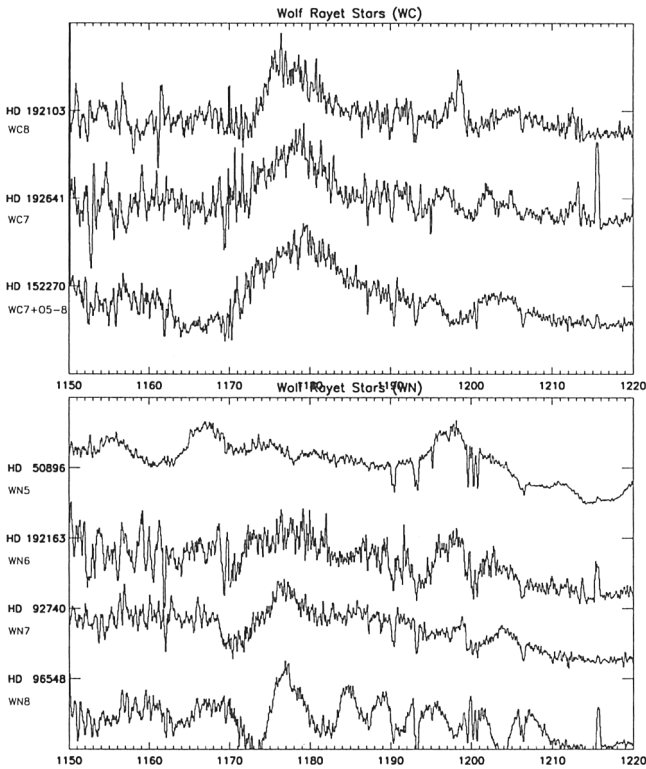


Figure 1. *Top: IUE NEWSIPS spectra of WC stars; Bottom: IUE NEWSIPS spectra of WN stars.*

P-Cygni profile, or as emission only, with the emission portion very broad (10 Å or more). The other common feature in the WC spectra is broad absorption near 1200 Å. This feature is typically 3–5 Å FWHM and could be due to Si III, Mn II, and/or N IV.

Figure b shows four NEWSIPS-spectra of WN stars. The two lower spectra clearly show C III P-Cygni profiles. The spectrum of HD 192163 has few distinct features in this example, although the C IV/N IV blend at 1169 Å is quite strong. The spectrum of HD 50896 is unusual. The spectrum is dominated by two strong P-Cygni profiles near 1167 and 1197 Å. In addition, there is a broad emission feature near 1154 Å. McCandliss *et al.* (1993) suggest that the features at 1152 and 1167 Å are due to Fe VI with some blending of the latter with N IV at 1169 Å. The feature at 1196 Å may also be due to N IV. No C III feature is present. Otherwise there are very few features outside of known interstellar lines of Si II.

References

McCandliss, S.R., Buss, R.H., Blair, W.P., Bowers, C.W., Davidsen, A.F., Feldman, P.D., Kruk, J.W. 1993, *ApJ* 416, 372