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THE BEHAVIOR OF THE NIV 5203.2 Å LINE IN STARS WITH WOLF-RAYET AND EARLY O-TYPE SPECTRA

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In our study of the WN+OB binary LSS 1964 = WR 29 (Niemela & Gamen 2000), we detected an absorption line at $\lambda \sim 5203$Å, which we identified as NIV (cf. Striganov & Sventitskii 1968). This absorption line had been observed previously in the spectra of two Of stars, namely ζ Puppis (Baschek & Scholz 1971) and HD 14947 (Underhill & Gilroy 1990). To our surprise we found that this NIV absorption line belongs to the WN component of the WR 29 binary system. We therefore decided to study the behaviour of this line in the spectra of other WR and early O-type stars.

Spectra of WN and O type stars were secured with the 2.15-m telescope at Complejo Astronómico El Leoncito (CASLEO), San Juan, Argentina, with the Cassegrain REOSC spectrograph , using a TEK CCD as detector. The spectra have a reciprocal dispersion of ~ 1.8 Å pixel^{-1} and a wavelength coverage of $\sim \lambda\lambda$ 3850 – 5450 Å. We observed 60 WN stars and 10 O stars. The subtype (Smith et al. 1996) distribution of the WN stars is the following: 37 WNo, 4 WN(h), and 19 WNh. All the spectra were processed with IRAF. We measured the equivalent width (EW) of NIV 5203Å in all the observed spectra.

We found NIV 5203Å in absorption in WN stars of the Carina Region, namely WR 22 (WN7h+O9III-V), WR 24 (WN6ha) and WR 25 (WN6ha). In the known WN+O binary system WR 22, the NIV absorption line shows radial velocity variations which are in phase with the HeII emission line. Thus, also in WR 22 the NIV absorption arises in the atmosphere of the WN component.

The photospheric absorption line of NIV 5203 Å in the spectra of WN type components of binary systems probably represents better the orbital motion than the emission lines arising in the stellar wind.

In general, we have found that NIV 5203 Å is observed as a photospheric absorption line in stars with early O-type and WNh type spectra. In stars with WN(h) and WNo type spectra, a P-Cygni type profile or an emission line appears. The absorption line

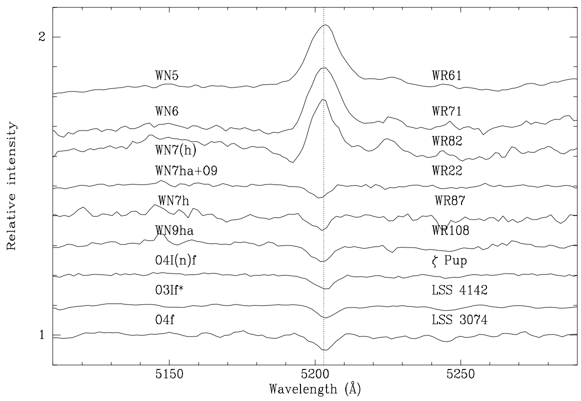

Fig. 1. Continuum rectified spectra of O-type and WN-type stars, showing the NIV 5203 Å line.

of NIV 5203 Å in the spectra of O type stars is certainly related to the abundance of N and the stellar effective temperature. A larger spectral sample of early O type stars is needed to characterize the behavior of NIV absorption in these stars.

In our sample, the behaviour of the EW of NIV 5203 Å shows a smooth progression from absorption in O, Of and Of/WN stars to emission in pure WN-type spectra. Similar progressions have been noticed in other quantitative spectroscopic properties of stars with early O and WN type spectra.

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