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STRUCTURE AND BEHAVIOR OF IONIZED STELLAR WINDS

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During the last decade the standard model assumptions (a steady, isotropic and homogeneous wind) have been questioned. We present a set of new VLA observations at 3.6 and 6 cm for P Cyg, Cyg OB2 No. 12 and WR 147. These objects have been reported to possess winds that may deviate from these basic assumptions. We discuss preliminary results for each source.

P Cyg: This source shows variable radio emission of up to 50% without appreciable changes in its spectral indices (Contreras et al. 1996). In this work we have determined flux densities at 3.6 and 6 cm. Comparing these new fluxes with our previous values, we found that they have decreased by $\sim 12\%$ and $\sim 30\%$, respectively. Although the flux densities have changed, the derived spectral index $\alpha_{3.6-6\mathrm{cm}} = 1.0$ is still consistent with that expected for a classical thermal wind. Morphologically, its wind seems to be spherical (Table 1). P Cyg's radio variability has still to be explained and it needs to be monitored at shorter time intervals.

Cyg OB2 No. 12: Although previous flux density values did not show time variations, the new 3.6 and 6 cm flux densities presented in this work show appreciable changes. The fluxes have increased by $\sim 14\%$ and $\sim 12\%$, respectively, compared with their previous values. Thus, it seems that Cyg OB2 No. 12 also shows radio variability. Although its derived spectral index ($\alpha_{3.6-6\mathrm{cm}} = 1.3$) is larger than the expected value, we can consider it consistent with a thermal wind. Based on a 2-D Gaussian fit to the source, we found that its wind is spherically symmetric (see Table 1).

WR 147: This is a binary system whose northern component, WR 147N, emits non-thermal radiation. Its southern thermal component shows time variable radio emission as well as possible inhomogeneities (Contreras & Rodríguez 1999; Watson et al. 2002). While our new 3.6 cm flux density for WR 147N is consistent within error with its 1996 value, the WR 147S flux shows a decrease of $\sim 14\%$. The 6 cm flux density of both sources could not be compared with any reported value. The WR 147S spectral index ($\alpha_{3.6-6\mathrm{cm}} = 0.5$) is consistent with a thermal wind and the WR 147N index ($\alpha_{3.6-6\mathrm{cm}} = 0.1$) is clearly flat, suggestive of non-thermal contamination.

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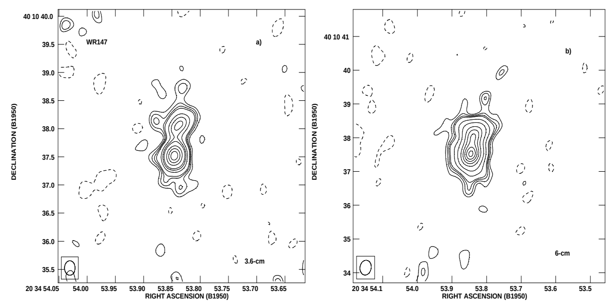

Fig. 1. CLEANed 3.6 and 6 cm maps of WR 147. Both maps were obtained using a uniform data weight. These maps show the complicated structure of this binary system.

TABLE 1

MAIN PARAMETERS

Source	$S_{3.6\mathrm{cm}}$ [mJy]	$S_{6\mathrm{cm}}$ [mJy]	$\theta_{3.6\mathrm{cm}}$[a] [arcsec]
P Cyg	10.77 ± 0.18	6.18 ± 0.08	0.19×0.15
Cyg OB2-12	8.21 ± 0.14	4.07 ± 0.09	0.14×0.13
WR 147S	26.98 ± 0.47	20.49 ± 0.23	0.24×0.21
WR 147N	11.79 ± 0.62	11.21 ± 0.22	0.42×0.25

[a]Errors in the deconvolved size are $\sim 0\farcs01$.

In Figure 1 we present maps obtained from our 3.6 and 6 cm data. The two components, as well as some of the southern component structure, are clearly seen. Surprisingly, the northern source shows a small emitting blob that has not been observed in previous work (Contreras & Rodríguez 1999; Watson et al. 2002). However, this small blob emission is only at a 3σ level. We need to explore the fine structure of both sources in more detail.

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