THE INFRARED SPECTRUM OF P CYGNI

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ABSTRACT. An energy distribution for P Cyg (B1 Ia$^+$) has been produced using UKIRT photometry and spectra, flux-calibrated IUE high-resolution spectra, Johnson and Mitchell 13-colour photometry and *IRAS* photometry. Infrared excesses due to free-free emission from the wind have then been derived and modelled.

1. The Infrared Excesses

The IR excesses were derived by fitting a Kurucz model atmosphere to the UV and optical data, the best fit being given by a model with T_{eff} =18000K and log g=2.05. Subtracting this model from the observations gave the excess fluxes, which have been modelled assuming a spherically symmetric wind parameterised by either Castor and Lamers (CL) velocity laws of index β or by the linear velocity law used by Waters and Wesselius (1986, *Astr. Astrophys.*, **155**, 104). A full treatment of electron scattering and free-free and bound-free opacity was included, along with the radial dependence of wind electron temperature given by the work of Drew (1989, *Astrophys. J. Suppl.*, **71**, 267).

2. Results

A good fit to the observations was found using the linear velocity law with the following parameters :

T_{eff} =18000K	log g=2.05	R_*= 92.5 $R_\odot$	D=1.8kpc
v_∞= 206 km s^{-1}	$v(R_*)/v_\infty$= 0.175	$\dot{M}$ = 2.16×10^{-5} $M_\odot y^{-1}$	n(He)/n(H) = 0.5

the value of v_∞ is taken from Lamers *et al.* (1985, *Astr. Astrophys.*, **149**, 29), $\dot{M}$ from radio observations of van den Oord (1985, in *Radio Stars*), n(He)/n(H) was derived from the *JHKL* spectra and R_* by normalising the Kurucz model to the J band magnitude.

3. Discussion

It was found that the linear velocity law gave the best fit to the observations. The CL velocity laws predicted energy distributions which fell off too steeply longward of ~10μm. It appears that longward of ~25μm the adopted model starts to predict smaller excesses than are observed—the possible need to include density fluctuations such as those predicted by Owocki *et al.* (1988, *Astrophys. J.*, **335**, 914) will be investigated.

K. A. van der Hucht and B. Hidayat (eds.),
Wolf-Rayet Stars and Interrelations with Other Massive Stars in Galaxies, 558.