

An Empirical Analysis of the Stellar Wind and Planetary Nebulae of the [WC10] Central Stars CPD-56° 8032 and He 2-113.

Orsola De Marco, M.J. Barlow and P.J. Storey

Dept. of Physics and Astronomy, University College London, Gower Str., London WC1E 6BT, UK

[WC] stars are H-deficient central stars of PN which have developed a dense, fast stellar wind. Their spectra can mimic the spectra of massive ($M_{\text{in}} \sim 50M_{\odot}$) Wolf-Rayet stars of the carbon sequence. Deriving their parameters is of importance both in understanding the PN and the Wolf-Rayet phenomena. Spectra of both objects were obtained at the AAT in May 1993 with the UCL Echelle Spectrograph (3500–9200 Å, $R=50,000$). The reddening, determined from comparing the $H\beta$ nebular line fluxes with radio fluxes from Purton et al. (MNRAS 128, 321, 1982), yielded $E(B-V)=0.68$ (CPD-56° 8032) and 1.00 (He 2-113). Distances are derived using two different methods and they agree within the relative uncertainties. They are 1.35 and 1.50 kpc for CPD-56° 8032 and He 2-113, respectively. The electron temperatures of the C II line formation region in the wind is derived from a recombination line analysis (20,000 and 17,000 K for CPD-56° 8032 and He 2-113, respectively). From the same stellar wind recombination line analysis, we find $C/He=0.12$ and 0.16, together with $O/He=0.19$ and 0.25, for CPD-56° 8032 and He 2-113 respectively.

Nebular temperatures (8800 K for CPD-56° 8032 and 8400 K for He 2-113), densities ($\log(N_e)=4.8 \text{ cm}^{-3}$ for both objects) and abundances of N, S and C, are also obtained. N/H and S/H have solar values while C/H is considerably enhanced. Pre-COSTAR HST $H\beta$ images were deconvolved and are presented below for the first time.

III. Central Stars

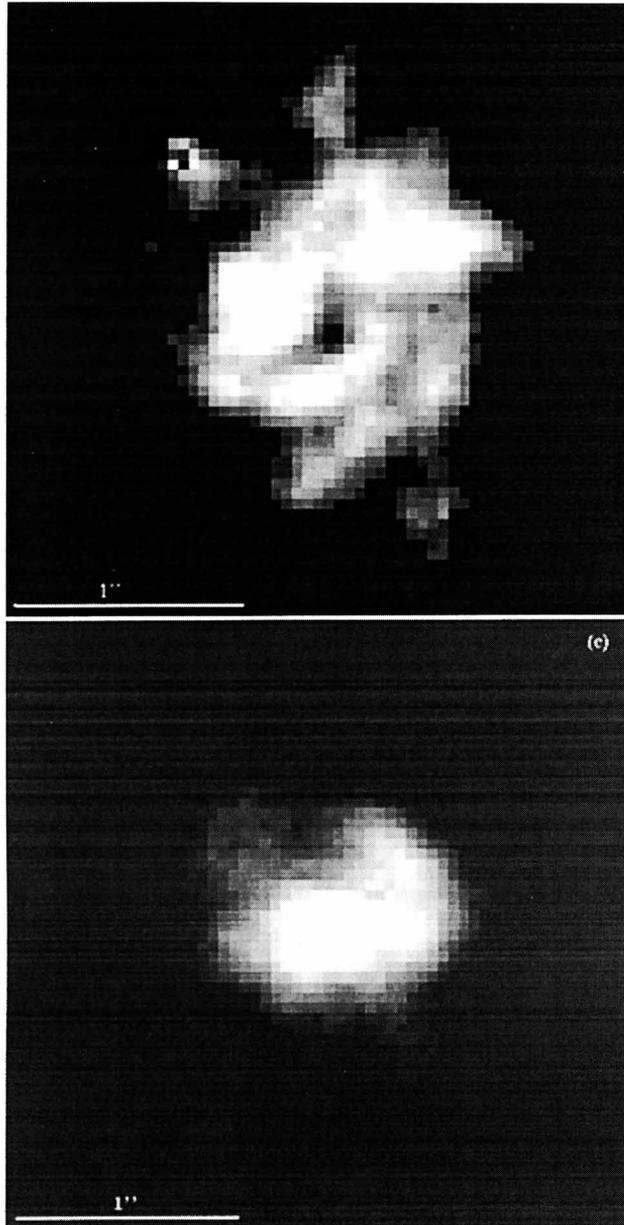


Figure 1: HST WFPC-1 images of the nebulae around CPD-56° 8032 (left) and He 2-113 (right). North is towards the upper left-hand corner in each case.