Modelling the Stellar Winds of the [WC10] Central Stars CPD–56° 8032 and He 2–113.

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[WC] stars are H–deficient central stars of PN which can mimic the spectra of massive ($M_{in} \sim 50 M_\odot$) Wolf-Rayet stars of the carbon sequence and can be modelled using the same techniques. Our model calculations for the [WC10] CPD–56° 8032 and He 2–113 are based on the iterative technique of Hillier (A&A 231 111 1990) which solves the transfer equation in the co-moving frame subject to statistical and radiative equilibrium, assuming an expanding, spherically-symmetric, homogeneous and time–independent atmosphere. In extended atmospheres the stellar radius ($R_\star$) is defined as the inner boundary of the model atmosphere at τ_{Ross}=20, with the stellar temperature ($T_\star$) defined by the usual Stefan-Boltzmann ($T_\star = (L_*/4\,\pi\,\sigma\,R_\star^2)^{1/4}$) relation. For a given mass loss rate ($\dot{M}$), the density and velocity field ($v(r) = v_\infty\,(1 - R_*/r)^\beta$ for the supersonic part) are related via the equation of continuity $\dot{M} = 4\,\pi\,r^2\,\rho(r)\,v(r)$.

The observational data and empirically derived parameters (such as reddening and distance) used in our model, are described by De Marco et al. (these proceedings). Overall our results show good agreement with the recent analysis of Leuenhagen et al. (A&A 312 167 1996). For both stars the stellar luminosity was assumed to be the average luminosity for a set of LMC central stars (5300 $L_\odot$). Terminal wind velocities were determined to be 225 km s^{-1} and 160 km s^{-1} for CPD–56° 8032 and He 2–113 respectively. The stellar temperatures are 34500 K and 30500 K for CPD–56° 8032 and He 2–113, while the effective temperatures are very similar (30000 K) for both stars. Mass loss rates are found to be high for PN central stars, namely log $\dot{M}$=–5.4 $M_\odot$/yr (CPD–56° 8032) and –6.1 $M_\odot$/yr (He 2–113). The stellar abundances (by number) are C/He=0.5 and O/He=0.1 (CPD–56° 8032) and 0.6 and 0.2 (He 2–113). In conflict with Leuenhagen et al., we do not find hydrogen to be present in the stellar atmosphere, and ascribe the irregular shape of the Balmer lines to an asymmetric velocity distribution of the nebula. The electron wind temperature and density in the C II line formation region are similar for the two stars ($T_e \sim 20000$ K, $N_e \sim 10^{11}$ cm^{-3}). The wind electron temperature is in reasonable agreement with the empirical determination of De Marco et al. (these proceedings). We also make a quantitative comparison between theoretical ionising fluxes with those obtained from the usual Zanstra technique.

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