Reduced Wolf-Rayet Line Luminosities at Low Metallicity

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New NTT/EMMI spectrophotometry of single WN2-5 stars in the Magellanic Clouds
are presented, from which HeII 4686 line luminosities have been derived, and compared with observations of other Magellanic Cloud WR stars. SMC WN3-4 stars possess line luminosities which are a factor of 4 times lower than LMC counterparts, incorporating several binary SMC WN3-4 stars. Similar results are found for WN5-6 stars, despite reduced statistics, incorporating observations of single LMC WN5-9 stars. CIV 5808 line luminosities of carbon sequence WR stars in the SMC and IC1613 (both WO subtypes) are a factor of 3 lower than LMC WC stars from Mt Stromlo/DBS spectrophotometry, although similar results are also obtained for the sole LMC WO star. We demonstrate how reduced line luminosities at low metallicity follow naturally if WR winds are Z-dependent, as recent results suggest. We apply mass loss-Z scalings to atmospheric non-LTE models of Milky Way and LMC WR stars to predict the wind signatures of WR stars in the metal-poor star forming WR galaxy IZw18. WN HeII 4686 line luminosities are 7-20 times lower than in Z-rich counterparts of identical bolometric luminosity, whilst WC CIV 5808 line luminosities are 3-6 times lower. Significant He^+ Lyman continuum fluxes are predicted for Z-poor early-type WR stars. Consequently, our results suggest the need for larger population of WR stars in IZw18 than is presently assumed, particularly for WN stars, potentially posing a severe challenge to evolutionary models at very low Z. Finally, reduced wind strengths from WR stars at low Z impacts upon the immediate circumstellar environment of long duration GRB afterglows, particularly since the host galaxies of high-redshift GRBs tend to be Z-poor.

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Comments:

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