**Physical properties of Galactic O-type giants and the weak wind problem**

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Quantitative analyses of Galactic late O dwarfs (O8-O9.5V) in the literature raised the so-called weak wind problem. The mass loss rates determined for these objects with atmosphere models are up to 2 orders of magnitude lower than the values predicted by theory. Such predictions are currently used in the most modern stellar evolution codes.

Our aim is to investigate the stellar and wind properties of Galactic late O giants (O8-O9.5III). Works focusing on these stars are scarce. They are supposedly more evolved than dwarfs and possess luminosities around the critical value proposed in the literature (log(L/LSun) ~ 5.2) where the weak wind problem seems to begin. We perform a spectroscopic analysis of 9 late O giants using atmosphere models from the code CMFGEN. We used ultraviolet and optical data to derive the stellar and wind properties for the objects of our sample. We used the following diagnostics in the ultraviolet: Fe III-IV-V lines (projected rotational velocity and effective temperature), P-Cygni profiles of C IV 1548,1551 (mass-loss rate and terminal velocity), and Si IV 1394,1403 (mass-loss rate). In the optical, we used the He I-II lines (effective temperature), wings of Balmer lines (gravitational acceleration), broadening of weak metal and He I lines (projected rotational velocity), and the Hα profile (mass-loss rate). We use different diagrams (e.g., H-R; predicted vs derived mass-loss) to analyse the results in the context of the weak wind problem.

Overall, we achieved a good fit to the optical and ultraviolet spectra of the sample. The effective temperatures derived separately from the UV and optical data are in good agreement. Our fits to the C IV 1548,1551 profiles suggest lower values for the β parameter of the velocity law than the ones usually found for other O stars. The wind parameters obtained were compared with different theoretical predictions. Our derived mass-loss rates are significantly lower (by ~ 0.9 - 2.3 dex) than the ones provided by the recipe currently in use in the majority of stellar evolution codes (Vink). That is, late O giants present weak winds. On the other hand, another set of predictions (Lucy) provide a better agreement to our derived values but fail to predict the observed OB supergiants mass-loss rates. We compare the mass-loss rates obtained from the ultraviolet and optical. We found that they agree for 4 objects out of 7 (within error bars). Despite our efforts, we fail to reproduce Hα and ultraviolet wind lines simultaneously in 3 stars. Nevertheless, our conclusions regarding weak winds remain unchanged.

Our results are the first to show the weak wind problem on O stars besides the O8-9V class. They demonstrate that weak winds are not due to evolutionary effects and strongly suggest that stellar evolution models overestimate the mass loss rates of the majority of O stars from the Main Sequence up to end of H-burning phase. The evolutionary consequences of these results remain to be investigated.