

From measurements to predictions: Using state of the art model atmospheres in a new way

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In the last decades, stellar atmosphere codes have become a key instrument in analyzing massive star spectra. They have helped us to understand massive stars and their winds not only on a qualitatively level, but allow us to derive stellar and wind parameters, such as temperature, terminal wind velocity and especially mass-loss rates. The tremendous amount of physics and atomic data included in current state-of-the-art atmosphere codes make them very sophisticated tools.

For synthesizing spectra, mass-loss rate and velocity stratification have to be given as free parameters. By including the hydrodynamic equation self-consistently in a stellar atmosphere code, one can actually predict stationary wind parameters, e.g. the mass-loss rate, from a given set of stellar parameters.

Using the Potsdam Wolf-Rayet (PoWR) model atmosphere code, I will demonstrate the underlying concepts and outline the differences between models used for analyses and for predictive purpose. Results for the well-known O supergiant zeta Pup will be shown and remaining problems and uncertainties will be discussed.