CMFGEN MODELS OF WN3 BAT99-3

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INTRODUCTION

Although massive stars are important components of the Universe's ecosystem, the importance of binarity in their evolution remains unclear. The most massive stars evolve to the Wolf-Rayet (WR) stage, where they have been stripped of their hydrogen-rich outer layers. Their high luminosities create high mass loss, with correspondingly strong, broad emission lines. What fraction of WRs have been stripped by binary interactions and what fraction by stellar winds alone? We are working to determine the stellar characteristics of a nitrogen-rich WR, BAT99-3, comparing observed spectra to CMFGEN modeled spectra (**Hillier & Lanz 2001**). Constraining the physical properties of WR stars will allow detailed comparisons with single star (Geneva) evolution predictions and binary (BPASS) evolution predictions.

OBSERVATIONS

- ***Optical*** (3200 Angstroms - 1 micron): Magellan 6.5m Baade telescope (Las Campanas, Chile) MagE Spectrograph
- ***Near Infrared*** (1 - 2.5 microns): Magellan 6.5m Baade telescope (Las Campanas, Chile) FIRE Spectrograph
- ***Ultraviolet*** (0.115 - 0.325 microns): International Ultraviolet Explorer (IUE) Satellite

RESULTS

After finalizing the fit for BAT99-3, we will investigate other LMC WRs and determine their stellar parameters. Such investigation will help us to understand the fraction of binarity among WRs.

Contact me to disuss our current results:

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CMFGEN

We used the radiative transfer computer model, CMFGEN (**Hillier & Lanz 2001**), to investigate the characteristics of BAT99-3. CMFGEN generates a model of the stellar wind structure given a set of input parameters that detail the characteristics of the star and its wind, including temperature, luminosity, stellar radius, velocity at infinity, and elemental abundances. A model spectrum is produced based on given inputs.

BAT99-3

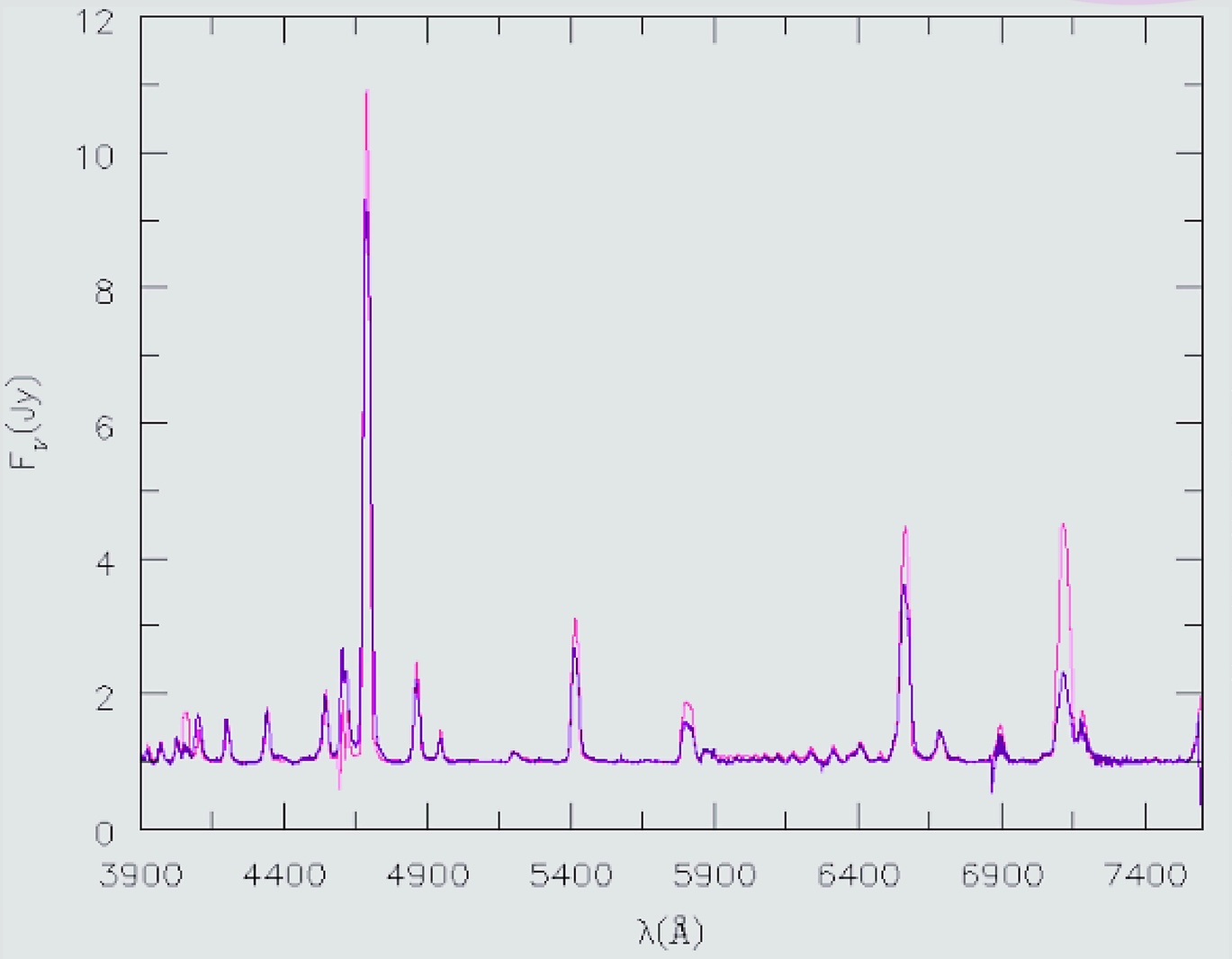

Figure 1. BAT99-3 Optical Spectrum (3900 - 7500 Angstroms). The observed (Purple) spectrum was collected on UT 2018 November 14 and Modeled (Pink) spectrum produced on UT 2024 May 28.

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