

The supergiant O + O binary system HD 166734: a new study

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Abstract. We present here a modern study of the radial velocity curve and of the photometric light curve of the very interesting supergiant O7.5If + O9I(f) binary system HD 166734. The physical parameters of the stars and the orbital parameters are carefully determined. We also perform the analysis of the observed X-ray light curve of this colliding-wind binary.

Keywords. stars: individual (HD 166734), binaries: spectroscopic, binaries: eclipsing, stars: supergiants, X-ray: binaries

1. Introduction

Massive stars are crucial actors in the life of their host galaxy. Despite this importance, our understanding is still poor and the determination of their physical parameters remains an essential task. Comparisons between evolutionary models and observations are essential to improve the former and better understand the evolution of these massive stars. In particular, binary systems give access to accurate values for some of the physical parameters. In this respect, HD 166734, a binary system made of two O supergiants which has been studied in the seventies, is interesting and deserves a modern study.

2. Results

We confirm the 34.54 d period derived by Conti *et al.* (1980) in the sole detailed study of this O7.5If + O9I(f) binary system. In our higher S/N study, the most massive star is now also the brightest and earliest one which is a more standard situation. The new eccentricity (slightly over 0.6) is larger than the previously determined one (0.46). The minimum masses are 28.2 M_{\odot} for the primary and 24.5 M_{\odot} for the secondary. The presence of an eclipse was reported by Otero & Wils (2005); we acquired a new light curve that clearly confirms the presence of a secondary eclipse with a depth of 0.2 mag and the lack of primary eclipse. From the CMFGEN analysis of the disentangled spectra, we derive effective temperatures of 32000 K and 30500 K, and $\log g$ values of 3.15 and 3.10 for the primary and the secondary, respectively. Our analysis indicates a well evolved object. We also report the first X-ray light curve observed for this star, showing variations in flux by an order of magnitude, further underlining the interest of this colliding-wind binary.

References

- Conti, P. S., Massey, P., Ebbets, D., & Niemela, V. S. 1980, *ApJ*, 238, 184
Otero, S. A. & Wils, P. 2005, *Inf. Bull. Var. Stars*, 5644, 1