

On the Evolutionary Stage of the Galactic Unclassified B[e] Star CD-42°11721

Marcelo Borges Fernandes,¹ Silvia Lorenz Martins,¹ Michaela Kraus,²
and Francisco X. de Araújo³

¹*Observatório do Valongo - UFRJ, Ladeira do Pedro Antônio 43,
20080-090, Saúde, Rio de Janeiro, Brazil*

²*Astronomický ústav, Akademie věd České republiky, Fričova 298,
251 65 Ondřejov, Czech Republic*

³*Observatório Nacional-MCT, Rua General José Cristino 77,
20921-400, São Cristóvão, Rio de Janeiro, Brazil*

Abstract. Our research aims to disentangle the evolutionary stage of the galactic unclassified B[e] star CD-42°11721. New high- and low-resolution optical spectroscopic data are used for a proper derivation of its stellar parameters. Based on these parameters and its location in the HR diagram, we favour a B[e] supergiant nature of CD-42°11721.

1. Introduction

CD-42°11721 is a galactic southern object showing the B[e] phenomenon. B[e] stars are stars of spectral type B with an optical spectrum showing strong Balmer line emission in combination with a huge amount of permitted Fe II lines and forbidden O I and Fe II lines. In addition, these stars exhibit a strong near- and mid-IR excess due to circumstellar dust.

The stellar parameters of CD-42°11721 are not well known, due to mainly its doubtful distance and foreground extinction. Therefore, until now it was impossible to draw any reliable conclusion about the nature of this star.

2. Stellar Parameters

Based on our new, high- and low-resolution optical spectroscopic data obtained with the FEROS and Boller & Chivens spectrographs, respectively, at the 1.52-m telescope at ESO (La Silla, Chile, agreement ESO/ON), we derive accurate stellar parameters for CD-42°11721 (see Table 1). The location of CD-42°11721 in the HR diagram, assuming our set of parameters and comparing to evolutionary tracks, is in agreement with being a post-main sequence object that has evolved from a progenitor star with an initial mass of about 8–10 M_{\odot} , lying in the region of well known B[e] supergiants (Fig. 1). For more details, including an IR analysis and the SED modeling, see Borges Fernandes et al. (2006).

Table 1. Stellar parameters for CD-42°11721 found from a proper analysis of our high- and low-resolution optical spectra.

| T_{eff} [K] | R_* [R_{\odot}] | L_* [L_{\odot}] | $\log g$ | d [kpc] | A_V [mag] |
|-------------------------|--------------------------|--------------------------|----------|--------------|----------------|
| 14 000 | 17.3 | 1.0×10^4 | ~ 3 | 1.15 | 4.8 |
| $\pm 1 000$ | ± 0.6 | $\pm 0.3 \times 10^4$ | | ± 0.15 | ± 0.2 |

3. Conclusions

We derived the stellar parameters of the galactic unclassified B[e] star CD-42°11721 with high accuracy from our new high- and low-resolution optical spectra. This new and complete set of stellar parameters allowed us tentatively to classify CD-42°11721 as a B[e] supergiant. However only with an abundance study (Kraus et al. 2006), the precise nature will be determined.

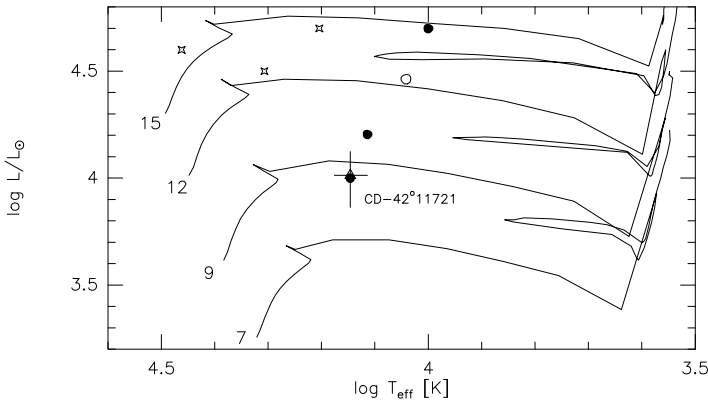


Figure 1. The location of CD-42°11721 in the HR diagram (triangle). Other symbols are for B[e] supergiants in the LMC (dots), SMC (circles) and Milky Way (asterisks). Data are from Lamers et al. (1998), and evolutionary tracks from Schaller et al. (1992).

Acknowledgments. M.B.F. acknowledges financial support from *CNPq* (Post-doc position - 150170/2004-1) and M.K. from GA ČR 205/04/1267.

References

- Borges Fernandes, M., Kraus, M., Lorenz Martins, S., & de Araújo, F.X. 2006, MNRAS, submitted
 Lamers, H. J. G. L. M., Zickgraf, F.-J., de Winter, D., Houziaux, L., & Zorec, J. 1998, A&A, 340, 117
 Schaller, G., Schaerer, D., Meynet, G., & Maeder, A. 1992, A&AS, 96, 269