

# Spectral Monitoring of the LBV Candidate J004526.62+415006.3 with the BTA

A. Sarkisyan<sup>1</sup>, O. Sholukhova<sup>1</sup>, S. Fabrika<sup>1</sup>, and A. Valeev<sup>1,2</sup>

<sup>1</sup> Special Astrophysical Observatory, Russian Academy of Sciences, Nizhny Arkhyz,  
Russia,

[ars@sao.ru](mailto:ars@sao.ru)

<sup>2</sup> Crimean Astrophysical Observatory, Russian Academy of Sciences, Nauchny, Russia

**Abstract.** We present results of the optical spectral monitoring of the Luminous Blue Variable (LBV) candidate J004526.62+415006.3 in the Andromeda galaxy. Monitoring was performed since 2011 till 2019 on the 6-m telescope of SAO RAS. The candidate shows spectral transitions distinctive for an LBV.

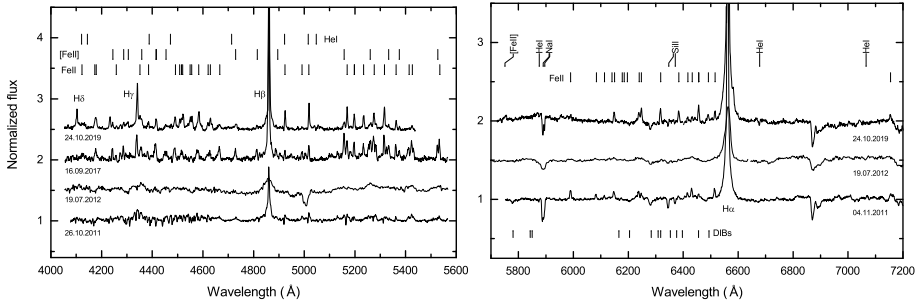
**Keywords:** stars: massive; stars: variables: S Doradus

DOI:10.26119/978-5-6045062-0-2.2020\_106

For the first time J004526.62+415006.34 was noted as a hot LBV candidate by Massey et al. (2007). Its spectrum from 2006 (Fig. 12 in Massey et al. (2007)) showed strong H emission lines with P Cygni profiles, weak He I emission and numerous Fe II emission lines. Later, Humphreys et al. (2014) presented spectrum of the object from 2010 closely resembled that of a warm hypergiant with P Cygni profiles in some Fe II emission lines, strong hydrogen emission with broad wings and P Cygni profiles, and the absorption line spectrum of an early A-type supergiant. Our spectrum from 2011 (Sholukhova et al. 2015) showed the evolution of the wind to cooler temperatures: hydrogen lines became much weaker, Fe II lines even turned to the absorption and no He I lines was detected. Moreover the spectral variability was followed by the photometric variability enabling us to classify this object as an LBV (Sholukhova et al. 2015). Humphreys et al. (2015) also confirmed LBV status of the object and presented its spectra of 2013 which closely resemble our one of 2011. In this paper, we present recent spectra of J004526.62+415006.3.

The optical spectra of the object were obtained with the SCORPIO spectrograph (Afanasiev & Moiseev 2005) on the 6-m telescope BTA SAO RAS. Normalized spectra of our star in different epochs of monitoring are shown in Figure 1. The resolution (as full width at half maximum (FWHM) of lines) is

## Monitoring of the LBV Candidate with the BTA



**Fig. 1.** The optical spectra of the J004526.62+415006.3 on different epochs of monitoring. The principal strong lines and diffuse interstellar bands (DIBs) are identified.

about 5 Å for all spectra except the spectrum of 19.07.2012 for which it is about 11 Å.

In addition to spectra from 2011 and 2012 showed previously in (Sholukhova et al. 2015) we present spectra of 2017 and 2019. They illustrate the change from the cold state in 2011-2012 back to the hot emission line star in 2017-2019 as it already was in 2006 (Massey et al. 2007). However it should be noted also weakening of [FeII] lines in comparison with FeII from 2017 to 2019. Apparently, the star reach locally hottest state around 2017 and now it is on the transition to a cooler temperature, and, accordingly, to new visual maximum state. So differences between the spectra obtained during monitoring illustrate the spectroscopic transition of J004526.62+415006.3 typical of LBV/S Doradus variables and confirm its LBV status.

*Acknowledgements.* This work was supported by the Russian Foundation for Basic Research (project N 19-52-18007).

## Bibliography

- Afanasiev, V. L. & Moiseev, A. V. 2005, *Astronomy Letters*, 31, 194  
Humphreys, R. M., Martin, J. C., & Gordon, M. S. 2015, *PASP*, 127, 347  
Humphreys, R. M., Weis, K., Davidson, K., Bomans, D. J., & Burggraf, B. 2014, *ApJ*, 790, 48  
Massey, P., McNeill, R. T., Olsen, K. A. G., et al. 2007, *AJ*, 134, 2474  
Sholukhova, O., Bizyaev, D., Fabrika, S., et al. 2015, *MNRAS*, 447, 2459