

The nature of V39: an LBV candidate or LBV impostor in the very low metallicity galaxy IC 1613?

A. Herrero (1,2), M. Garcia(1,2), K. Uytterhoeven (1,3), F. Najarro (4), D.J. Lennon (5), J.S. Vink (6) & N. Castro(1,2)

1 Instituto de Astrofísica de Canarias, C/ Via Lactea s/n, E-38200 La Laguna, Tenerife, Spain.

2 Departamento de Astrofísica, Universidad de La Laguna, Avda. Astrofísico Francisco Sánchez s/n, E-38071 La Laguna, Tenerife, Spain.

3 Laboratoire AIM, CEA/DSM-CNRS-Université Paris Diderot; CEA, IRFU, SAp, centre de Saclay, F-91191, Gif-sur-Yvette, France

4 Centro de Astrobiología (CSIC-INTA), Ctra. de Torrejón a Ajalvir km-4, E-28850, Torrejón de Ardoz, Madrid, Spain

5 ESA, Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA

6 Armagh Observatory, College Hill, Armagh BT61 9DG, Northern Ireland

Context: Very few examples of luminous blue variable (LBV) stars or LBV candidates (LBVc) are known, particularly at metallicities below the SMC. The LBV phase is crucial for the evolution of massive stars, and its behavior with metallicity is poorly known. V39 in IC 1613 is a well-known photometric variable, with B-band changes larger than 1mag. over its period. The star, previously proposed to be a projection of a Galactic W Virginis and an IC 1613 red supergiant, shows features that render it a possible LBVc.

Method: We investigate mid-resolution blue and red VLT-VIMOS spectra of V39, covering a time span of 40 days, and perform a quantitative analysis of the combined spectrum using the model atmosphere code CMFGEN.

Results: We identify strong Balmer and FeII P-Cygni profiles, and a hybrid spectrum resembling a B-A supergiant in the blue and a G-star in the red. No significant Vrad variations are detected, and the spectral changes are small over the photometric period. Our analysis places V39 in the low-luminosity part of the LBV and LBVc region, but it is also consistent with a sgB[e] star.

Conclusions: The radial velocity indicates that V39 belongs to IC 1613. The lack of Vrad changes and spectroscopic variations excludes binary scenarios. The features observed are not consistent with a W Virginis star, and this possibility is also discarded. We propose that the star is a B-A LBVc or sgB[e] star surrounded by a thick disk precessing around it.

If confirmed, V39 would be the lowest metallicity resolved LBV candidate known to date. Alternatively, it could represent a new transient phase of massive star evolution, an LBV impostor.

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Email: mgg@iac.es