## Modeling of spectral variability of Romano's star

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We present results of investigation of spectral variability of one of the most interesting massive stars, Romano's star (M33/V532 or GR290), located in the M33 galaxy. Brightness of the star changes together with its spectral class, which varies from WN11 to WN8. Using CMFGEN code we estimated parameters of stellar atmosphere and found that during last ten years bolometric luminosity of the star changed synchronously with stellar magnitude. Our calculations argue in favor of the hypothesis of a post-LBV status of GR290.

We have used the CMFGEN atmospheric modeling code (Hillier & Miller 1998) and new spectral data as well as archival data. In order to see how parameters of GR290 changed with time we constructed nine models for most representative spectra with best quality, obtained between 2002 and 2014. Table 1 lists the parameters of the models, while the model spectra themselves are shown in Figure 1. The main result of this analysis is that the bolometric luminosity of GR290 is variable, it is higher during the phases of larger optical brightness. We argue that GR290 is now in a short, and thus very rare transition phase between the LBV state and the W-R nitrogen rich stellar class. More details will be published in the article by V. F. Polcaro, O. Maryeva, R. Nesci, M. Calabresi, A. Chieffi, S. Galleti, R. Gualandi, R. Haver, A. Pasquali, C. Rossi, T. Vasilyeva, R. F. Viotti, which now is in preparation.

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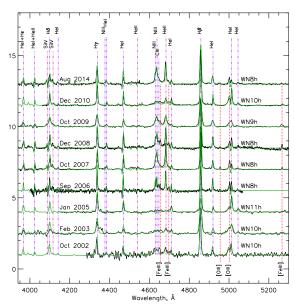


Fig. 1: Normalized optical spectra of GR290 compared with the best-fit CMFGEN models (green line).

**Tab. 1:** Derived properties of GR290. Hydrogen number fraction relative to helium H/He= $1.7 \pm 0.2$ . Filling factor  $f = 0.2 \pm 0.1$ . In calculations we assume that the distance to the M33 galaxy is  $D = 847 \pm 60$  kpc.

Date	V [mag]	Sp. type	$T_{\rm eff}$ [kK]	$R_{2/3}$ [R $_{\odot}$ ]	$L_*, 10^5$ $[L_{\odot}]$	$\dot{M}_{cl}, 10^{-5}$ $[\mathrm{M}_{\odot}/\mathrm{yr}]$	$v_{\infty}$ [km/s]
Oct 2002 Feb 2003	17.98 17.70	WN10h WN10.5h	27.5 28	35.4 37	6.5 7.5	2.1 2.2	200 200
Feb 2005 Sep 2006	17.24 18.4	WN11h WN8h	23.3 31	61.2 26	10 5.5	4	200 200
Oct 2007	18.6	WN8h	33.5	21.6	5.3	1.7	400
Dec 2008 Oct 2009	18.31 18.36	WN8h WN9h	$31.5 \\ 32$	$24.5 \\ 25.2$	5.3 6	2.0 1.7	400 300
Dec 2010 Aug 2014	17.66 $18.74$	WN10h WN8h	$26.4 \\ 32.7$	$\frac{43}{22}$	8 5.1	$\frac{2.6}{1.7}$	200 400

## References

Hillier, D. J. & Miller, D. L. 1998, ApJ, 496, 407