

A search for the most massive stars in M 33

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Abstract. We present results of a search for the most massive LBV-like stars in M 33 and discuss the list of OB+H α stars. Spectral studies of the 70 brightest stars ($V < 17.7$) from the list have isolated 14 new LBV candidates. They are evolved the most massive stars, some of them are variable stars.

1. Selection of candidates

The nearby galaxies provide unique possibility to study of the most massive stars: OB supergiants, hypergiants, Luminous Blue Variables, Ofpe/WN stars, B[e]-supergiants, and WR stars. In M 33 a systematic search has been carried out for OB+H α emission stars (Fabrika & Sholukhova, 1999) using H α images (Courtes *et al.* 1987) and a catalog of OB stars (Ivanov *et al.* 1993). The list of candidates contains 550 targets. We present here a study of the bright part of our list, 70 stars with $V < 17.7$. Among them there are three well known LBV stars: Var 2, Var B and Var 83. Spectra were taken for 45 targets. An other 25 stars were studied by Massey *et al.* (1996) as UV-brightest stars and Corral

Table 1. LBV candidates

N	V	B-V	U-B	M _{bol}	log T	var.	HS'80	UIT	Corral'96
394	16.48	0.23	-1.1	-11.4	4.62	Var83			
173	15.87	0.42	-0.7	-11.0	4.43				
265	16.40	0.20	-0.9	-12.1	4.46	DeB57			B1-1 302
423	16.70	0.00	-0.9	-11.0	4.49		B526	341	
80	16.90	0.10	-0.2	-8.4	4.08		17B		
41	17.00	0.00	-0.8	-9.7	4.32		B48		B1-5 299
535	17.07	0.07	-0.8	-9.0	4.27	DpB316		250	
458	17.08	0.18	-0.7	-9.3	4.31				
517	17.20	0.10	-1.0	-11.7	4.55				
53	17.30	0.00	-0.8	-8.3	4.32		B56		
126	17.58	0.02	-0.9	-10.2	4.50			125	B3-7 241
163	17.68	0.15	-0.8	-9.4	4.32	SGF97		154	B1-7 193
33	17.70	0.12	-0.6	-8.4	4.20	SGF97	B23		
124	17.70	0.42	-1.1	-11.0	4.44	DmB29463			

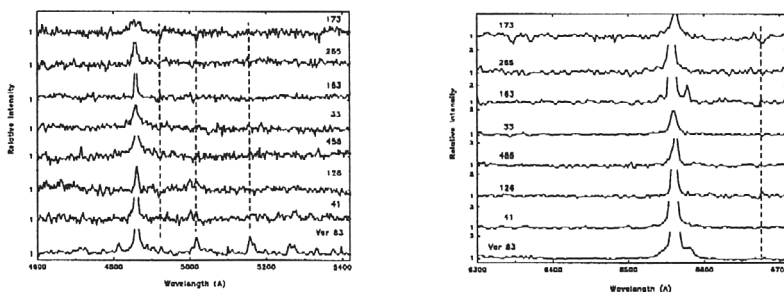


Figure 1. Spectra of some LBV candidates, with Var 83 for comparison. Positions of strongest He I and Fe II lines are indicated.

(1996) as LBV-type stars. Our observations were carried out with the long-slit spectrograph of the 6-m telescope, spectral resolution $\sim 7 \text{ \AA}$.

2. Results

Using the data of spectroscopy the stars were classified. There are three known LBV stars, 14 LBV candidates, 32 supergiant candidates, 3 WN+OB stars (Massey *et al.* 1996), and 17 others objects (H II regions, blue continuum with no line detected + H II and targets with dubious spectra). Table 1 presents LBV-candidates whose spectra we studied, with LBV Var 83 among them. It includes star numbers (Fabrika & Sholukhova, 1999); photometrical data (Ivanov *et al.* 1993); estimates of M_{bol} and T_{eff} ; data on variability, if known (SGF97: Sharov *et al.* (1997); other data are from project DIRECT (Mochejska *et al.* 2001)) and star names from Humphreys & Sandage (1980, HS), UIT list of UV-brightest stars by Massey *et al.* (1996) and from Corral (1996).

Figure 1 presents the spectra of our LBV-candidates and the known LBV Var 83 in two spectral regions. There are probably different types of stars among these LBV candidates; many of them are evolved from the most massive stars in M 33. Some stars have very unusual spectra. For example the brightest star, N 173, shows very broad and structured line profiles in H I and He I lines. The next spectral and photometrical studies of these stars are perspective.

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