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**V404 LYRAE IN THE FIELD
OF THE VERY OLD GALACTIC CLUSTER NGC 6791**

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V404 Lyrae was listed as a β Lyrae type eclipsing binary by Popova and Kraicheva (1984) in the field of the old galactic cluster NGC 6791 (its age is $t = 8 \pm 0.5$ Gyr, $m - M = 13^m42$, $E_{B-V} = 0.10$, Chaboyer et al. 1999). In the GCVS (Kholopov et al. 1985) the following ephemeris is found:

$$\text{Min. I} = \text{HJD } 2435836.462 + 0^d73094585 \times E. \quad (1)$$

According to our knowledge neither spectroscopic information nor light curve is available for V404 Lyr and there are only observations of minima published in the literature.

Therefore we observed the star on seven nights using the 1-m RCC-telescope of the Konkoly Observatory. The detector was a 1024×1024 electronically cooled Photometrics CCD-camera and we applied a 2×2 binning on the chip. We used Johnson–Cousins $V(I)_C$ filters. All frames were cleaned from cosmic ray events and we made bias and flat-field corrections. Dome-flats were used. The dark-current was negligible. The average seeing was about $2''.4$. The log of observations can be found in Table 1. In order to determine the instrumental magnitudes we used the IRAF/DAOPHOT package. From our observations we could determine two new moments of minima (see Table 2).

Table 1: Log of observations

Date of observation	<i>V</i>	<i>I</i>	Phase coverage	Note
JD 2451691	92	91	0.04 - 0.24	
2451692	72	72	0.38–0.52	
2451725	60	60	0.59–0.72	
2451728	9	9	0.82–0.83	thin clouds
2451729	30	30	0.16–0.22	
2451772	170	174	0.82–0.17	full moon
2451773	21	48	0.25–0.35	

In Table 2 the $(O - C)_{\text{GCVS}}$ represent the residuals using ephemeris (1). A linear fit to the data has been yielded better elements:

$$\text{Min. I} = \text{HJD } 2435836.448 + 0^d7309432 \times E \pm 0.014 \pm 0.0000006 \quad (2)$$

and the residuals are listed in Table 2 as $(O - C)_2$.

Table 2: Times of minima of V404 Lyr

HJD	E	Error	$(O - C)_{GCVS}$	$(O - C)_2$	Reference
2449787.5943	19086.5		-0.0657	-0.0011	Agerer & Huebscher (1997a)
2449799.6564	19103		-0.0642	+0.0005	"
2449857.3968	19182		-0.0685	-0.0037	"
2449865.4441	19193		-0.0616	+0.0033	"
2450158.5502	19594		-0.0648	+0.0011	Agerer & Huebscher (1997b)
2450248.4586	19717	± 0.0001	-0.0627	+0.0035	"
2450346.4006	19851	± 0.0021	-0.0675	-0.0086	Agerer & Huebscher (1998)
2450379.2939	19896	± 0.0014	-0.0667	0.0000	"
2450593.4582	20189	± 0.0011	-0.0696	-0.0021	Agerer & Huebscher (1999)
2450894.6115	20601	± 0.0007	-0.0660	+0.0026	"
2451299.5501	21155	± 0.0007	-0.0714	-0.0013	Agerer & Huebscher (2000)
2451308.698	21167.5	± 0.004	-0.060	+0.0098	Diethelm (2001)
2451312.7094	21173	± 0.0012	-0.0691	+0.0010	"
2451692.4324	21692.5	± 0.0005	-0.0724	-0.0010	this paper
2451772.4730	21802	± 0.0002	-0.0704	+0.0012	this paper

The comparison and check stars were GSC 3121-1597 and USNO 1275-1113 0035, respectively. These stars were standardized as given in Table 3 using our observations on some Landolt-standards located in the SA 113 area (Landolt 1983).

Table 3: Comparison stars for V404 Lyrae

Star	V	$V - I_C$
GSC 3121-1597	11.82	+0.51
USNO 1275-1113 0035	13.53	+0.78

To get the light-curve we used differential photometry. In order to determine the transformation constants for differential photometry, we applied the observations of Messier 67 which were made with the same instrument during January and February, 2000 on three nights by I. Tóth. Using the method described in Henden and Kaitchuck (1982) we got the transformation equations. The V light curve and the $V - I_C$ colour curve are shown in Figs. 1-2. The individual data points are available on the IBVS homepage.

At maximum light the brightness and colour index of V404 Lyr are $V = 11.39$, and $V - I_C = 0.47$, respectively. In order to estimate the distance modulus we used the method described in Dworak (1975). The interstellar reddening was estimated as $A_V = 3.0 \times E_{B-V} = 0^m30$ and the E_{B-V} was taken from Chaboyer et al. (1999). The distance modulus is 9.0 ± 1 magnitudes (its error comes mainly from the uncertainty of the inclination) which is significantly smaller than the distance modulus of NGC 6791 (i.e. 13^m42 , see above). Therefore V404 Lyr is not a member of this cluster.

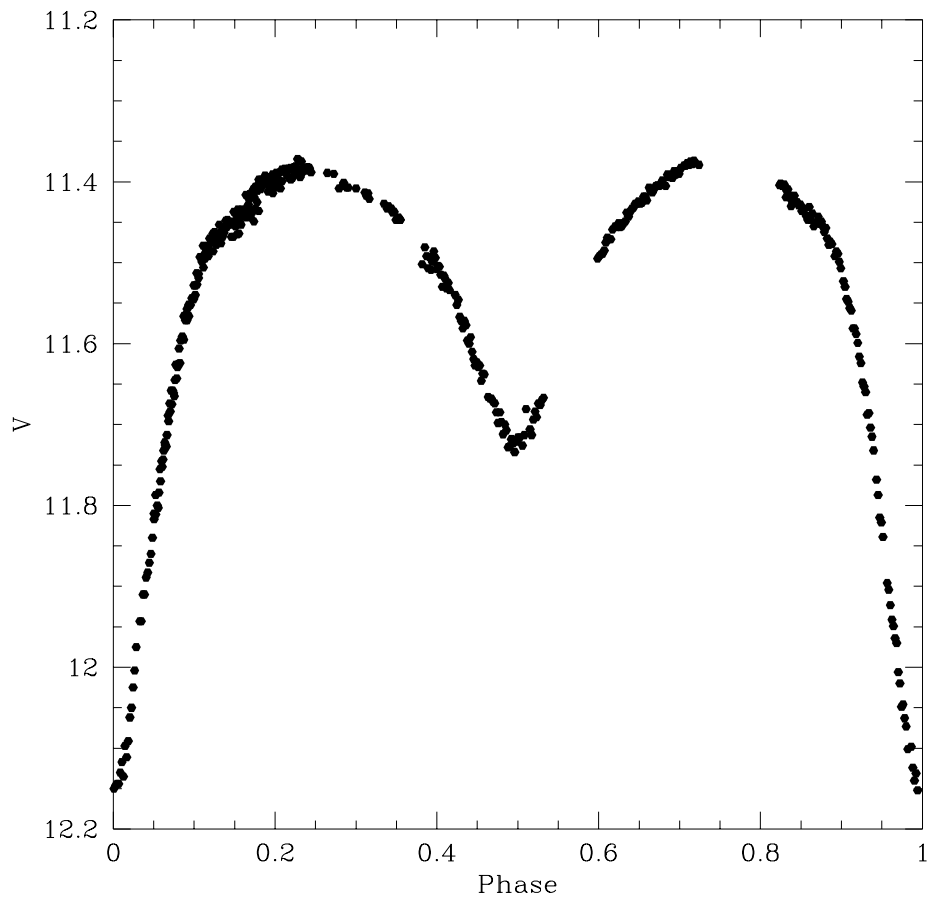


Figure 1. V -light curve of V404 Lyr

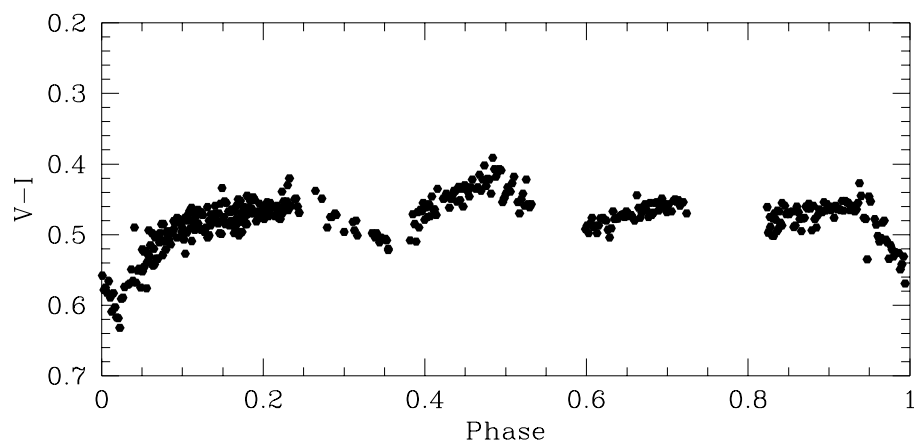


Figure 2. $V - I_C$ colour curve of V404 Lyr. Note that the system is redder at primary minimum and bluer at secondary one

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