Peremennye Zvezdy (*Variable Stars*) **39**, No. 1, 2019

Received 19 August; accepted 6 September.

BVI_c Photoelectric Observations of 16 Double-Mode Classical Cepheids

L.N. Berdnikov[1], A.Yu. Kniazev[1,2,3], A.K. Dambis[1], V.V. Kravtsov[1]

[1] Sternberg Astronomical Institute, Moscow State University, Universitetskij pr. 13, Moscow 119992, Russia; leonid.berdnikov@gmail.com

[2] South African Astronomical Observatory, P.O. Box 9, Observatory, Cape Town, 7935 South Africa

[3] Southern African Large Telescope Foundation, P.O. Box 9, Observatory, Cape Town, 7935 South Africa

We present 2902 magnitude measurements in the B, V, and I_c filters acquired in 1999–2004 for 16 double-mode classical Cepheids.

We performed photoelectric observations of double-mode Cepheids between March 10, 1999 and April 22, 2004 (JD 2451248–2453118) with the 0.76-m reflector of the South African Astronomical Observatory (SAAO), equipped with a pulse-counting photoelectric photometer. It is a cooled unit that employs a Hamamatsu photomultiplier in conjunction with BVI_c filters of the Kron–Cousins photometric system (Cousins, 1976). A description of the observing techniques can be found in Berdnikov and Turner (2004). Observational uncertainties are close to 0.01 mag in all bands.

We have obtained a total of 2902 measurements for 16 double-mode Cepheids, listed in the Table. The phases of the observations were calculated with the elements from GCVS (Samus et al., 2017) for BE Pup and U TrA; from Antipin (1997) for V458 Sct; from Berdnikov (1992) for AX Vel; and from ASAS-3 (Pojmanski, 2002) for the other stars. The star BE Pup was identified as a double-mode Cepheid by Hacke and Richert (1990); the GCVS considers it a doubtful CWB star. For all the listed Cepheids, with the exception of V1048 Cen, the period in the Table is that of the fundamental mode. V1048 Cen pulsates in the first and second overtones, and the period in the Table is that of the first overtone.

Table. The light elements of double-mode Cepheids

Star name		Epoch, JD	Period, d
DZ	CMa	2451873.680	2.311200
Y	Car	2451877.400	3.639700
EY	Car	2451877.470	2.876100
GZ	Car	2451875.800	4.160300
UZ	Cen	2451879.400	3.334300
BK	Cen	2451878.400	3.174000
V1048	Cen	2451871.660	0.922400
VX	Pup	2451878.360	3.011400
BE	Pup	2427810.457	2.871400
EW	Sct	2451977.900	5.816099
V367	Sct	2451980.500	6.292720
V458	Sct	2447733.420	4.841250
BQ	Ser	2452151.000	4.270270
U	TrA	2443267.140	2.568423
AP	Vel	2451878.380	3.127200
AX	Vel	2443878.900	3.673145

The observations themselves are available in the file attached to the html version of the paper.

The light curves folded with elements from the Table are displayed in Figs. 1–3.

Acknowledgments: This work was supported by the Russian Foundation for Basic Research (projects No. 18-02-00890 and No. 19-02-00611).

References:

Antipin, S.V., 1997, *IBVS*, No.4485
Berdnikov, L.N., 1992, *Soviet Astronomy Letters*, **18**, 259
Berdnikov, L.N., Turner, D.G., 2004, *Astron. Astrophys. Trans.*, **23**, 253
Cousins, A.W.J., 1976, *Mem. RAS*, **81**, 25
Hacke, G., Richert, M., 1990, Veröff. Sternwarte Sonneberg, **10**, 336, 1990
Pojmanski, G., 2002, *Acta Astron.*, **52**, 397
Samus, N.N., Kazarovets, E.V., Durlevich, O.V., Kireeva, N.N., Pastukhova, E.N., 2017, *Astronomy Reports*, **61**, 80

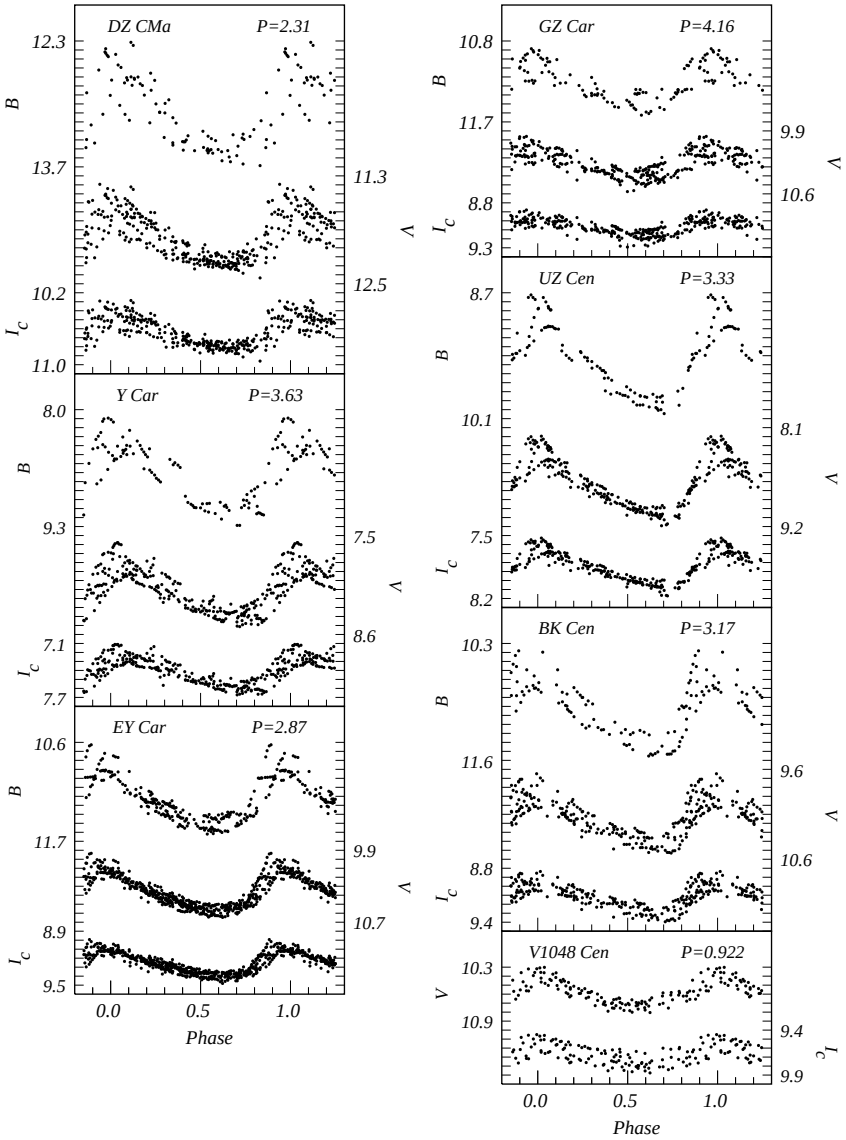

Figure 1. The light curves of the double-mode Cepheids DZ CMa, Y Car, EY Car, GZ Car, UZ Cen, BK Cen, V1048 Cen.

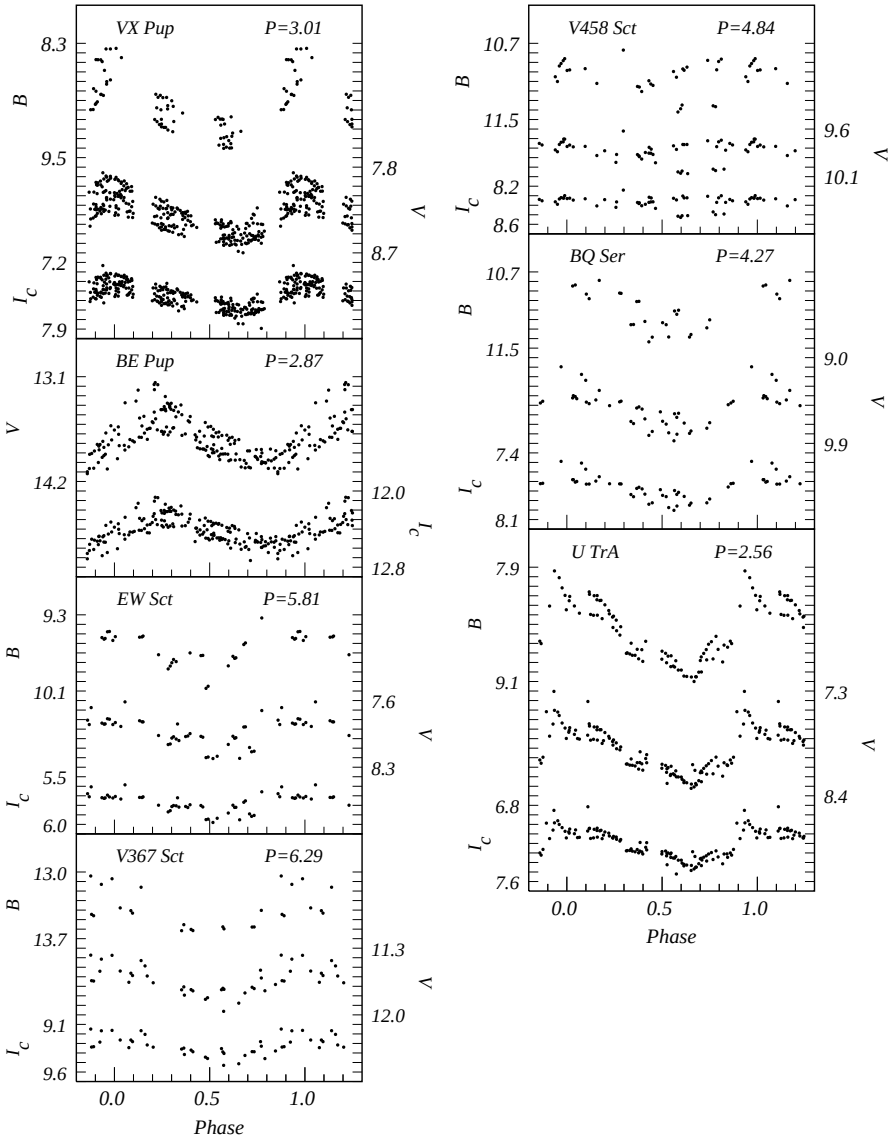

Figure 2. The light curves of the double-mode Cepheids VX Pup, BE Pup, EW Sct, V367 Sct, V458 Sct, BQ Ser, U TrA.

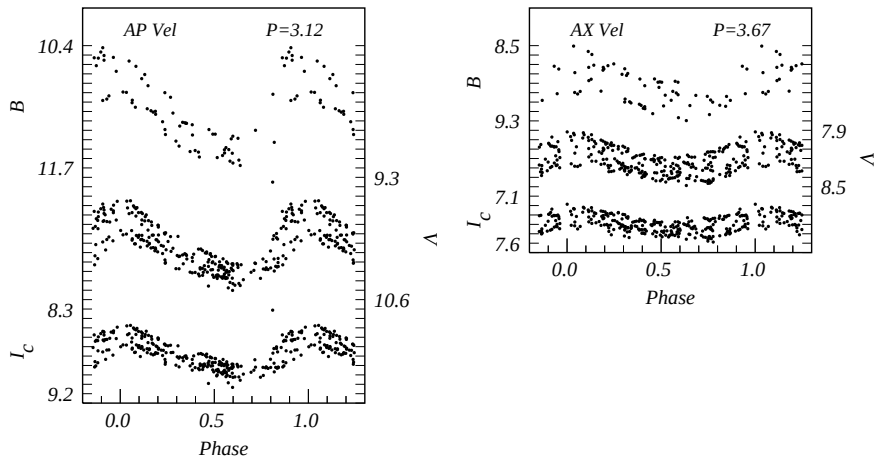

Figure 3. The light curves of the double-mode Cepheids AP Vel, AX Vel.