

DOI: <http://dx.doi.org/10.18524/1810-4215.2017.30.117671>

## UPDATED LIGHT ELEMENTS OF 10 RRAB STARS IN THE ANTLIA, CAELUM AND SCULPTOR CONSTELLATIONS

A.Kolotsey, M.Atroschenko, S.A.Dubrouski, I.I.Baluk

The Regional Centre of Technical Creativity of Children and Youth (RCTCCY)  
36A Oktyabrya Avenue, Gomel 246010 Belarus  
*toliman@tut.by; balig@tut.by; bis6411@gmail.com*

**ABSTRACT.** This paper presents the results of verification of the periods and other characteristics of 10 variable stars. The All Sky Automated Survey (ASAS) data have been used in this verification study. 10 RRab stars in the Antlia, Caelum and Sculptor constellations have been investigated. The study was performed using the software package developed by S.A.Dubrouski and V.P.Goranski.

### *ASAS J043516-4112.4*

The star was discovered by G.Pojmański in 2002 [1]. In 2015 the star was described in the paper by G.Torrealba [2]. The period of the star has been refined by I.I.Baluk. The UCAC4 position of the star: RA = 04h35m16.45s; Dec = -41°12'33".4. The star's catalogue identifiers: the 2MASS identifier – J04351645-4112333; the GSC identifier – 07582-00453; the USNO identifier – B1.0 0487-0041252; the UCAC4 identifier – 244-004867; the ASAS identifier – J043516-4112.4. The star's variability type: RRab. The peak brightness is 12.68m (in the V band); the minimum brightness is 13.02m (in the V band). The star's light ephemerides are plotted in Figure 1.  $M - m = 23\%$ .

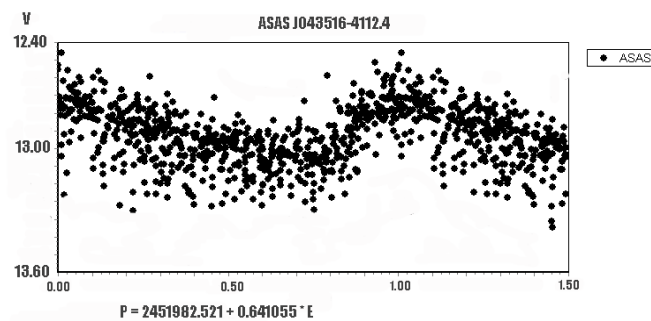


Figure 1

### *ASAS J042716-4828.0*

The star was discovered by G.Pojmański in 2002, and further investigated by D.M.Szczygieł, G.Pojmański and B.Pilecki [3], as well as by G.Torrealba, M.Catelan and A.J.Drake [4]. An individual investigation of the star was conducted by I.I.Baluk. The UCAC4 position of the star: RA = 04h27m16.34s; Dec = -48°28'04".0. The star's catalogue identifiers: the 2MASS identifier – J04271633-

4828040; the GSC identifier – 08072-01147; the USNO identifier – B1.0 0415-0035016; the UCAC4 identifier – 208-004473; the ASAS identifier – J042716-4828.0; the CD identifier – 48 1347. The star's variability type: RRab. The peak brightness is 11.53m (in the V band); the minimum brightness is 12.22m (in the V band). The star's light elements are depicted in Figure 2.  $M - m = 21\%$ . The Blazhko effect is barely noticeable.

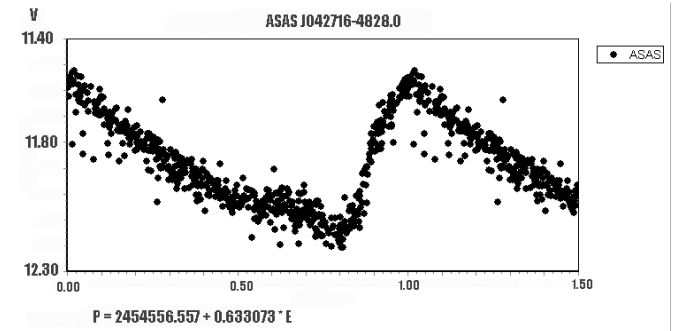


Figure 2

### *ASAS J042014-4236.2*

The star was discovered by G.Pojmański in 2002 [5]; it was further investigated by D.M.Szczygieł, G.Pojmański and B.Pilecki [6], as well as by G. Torrealba, M. Catelan and A.J.Drake [7]. An individual investigation of the star has been conducted by Anastasia Kolotsey. The UCAC4 position of the star: RA = 04h20m14.26s; Dec = -42°36'10".5. The star's catalogue identifiers: the 2MASS identifier – J04201425-4236105; the GSC identifier – 07584-00479; the USNO identifier – B1.0 0473-0053076; the UCAC4 identifier – 237-004452; the ASAS identifier – J042014-4236.2. The star's variability type: RRab. The peak brightness is 13.20m (in the V band); the minimum brightness is 14.25m (in the V band). The star's ephemerides are presented in Figure 3.  $M - m = 20\%$ .

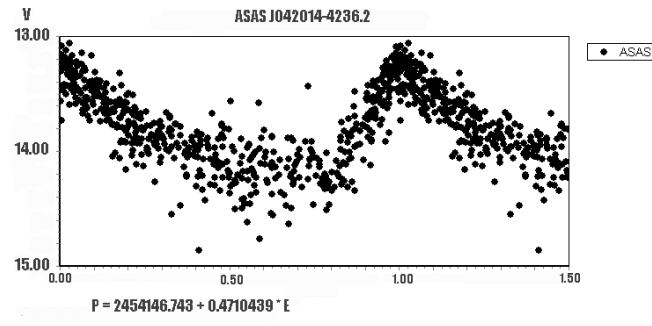


Figure 3

*BK Ant, ASAS J094415-3939.7*

The star was investigated by W.Strohmeier and I.Patterson in 1969 [8]; its further study was conducted by G.Pojmański in 2002 [9]. The star was also investigated by N.N.Samus in 2008 [10], and later by D.M.Szczygieł, G.Pojmański and B.Pilecki in 2009 [11]. Anastasia Kolotsey has reported the results of her individual investigation of the star. The UCAC4 position of the star: RA = 09h44m14.80s; Dec = -39°39'41".0. The star's catalogue identifiers: the 2MASS identifier – J09441481-3939411; the GSC identifier – 07697-00594; the USNO identifier – B1.0 0503-0193681; the UCAC4 identifier – 252-037970; the ASAS identifier – J094415-3939.7. The star's variability type: R Rab. The peak brightness is 11.83m (in the V band); the minimum brightness is 12.35m (in the V band). The star's ephemerides are plotted in Figure 4.  $M - m = 21\%$ .

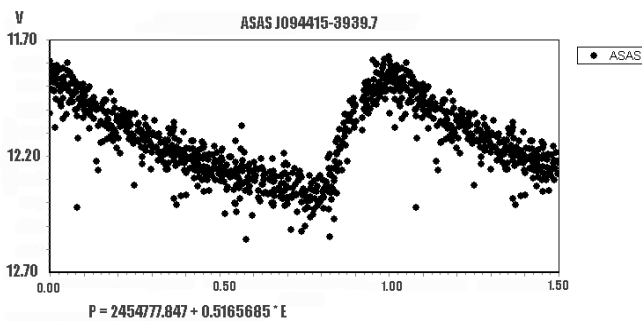


Figure 4

*BN Ant, ASAS J095706-3917.4*

The star was studied by W.Strohmeier, R.Knigge and H.Ott in 1965 [12]. G.Pojmański conducted further investigation of the star in 2002 [13]; his results were extended by E.V.Kazarovets, N.N.Samus, O.V.Durlevich, N.N.Kireeva and E.N.Pastukhova in 2008 [14]; D.M.Szczygieł, G.Pojmański and B.Pilecki in 2009 [15]; and G.Torrealba, M.Catelan, A.J.Drake, S.G.Djorgovski, R.H.McNaught, V.Belokurov, S.Koposov, M.J.Graham, A.Mahabal, S.Larson and E.Christensen in 2015 [16]. Milena Atroschenko has reported the results of her individual investigation of the star. The UCAC4 position of the star: RA = 09h57m05.98s; Dec = -39°17'26".4. The star's catalogue identifiers: the 2MASS identifier – J09570598-3917264; the GSC identifier – 07694-02169; the USNO identifier – B1.0 0507-0211233; the UCAC4 identifier – 254-041200; the ASAS identifier – J095706-

3917.4. The star's variability type: R Rab. The peak brightness is 11.68m (in the V band); the minimum brightness is 12.93m (in the V band). The star's ephemerides are presented in Figure 5.  $M - m = 14\%$ .

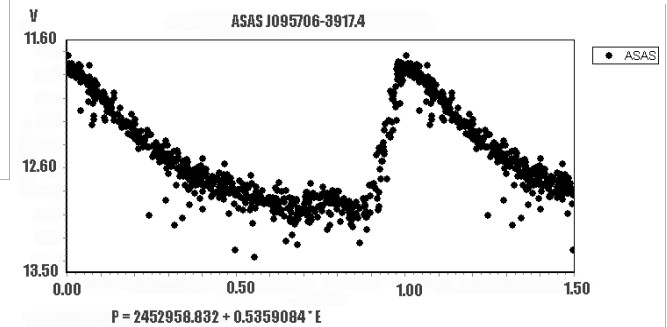


Figure 5

*SS Ant, ASAS J093911-2633.1*

The star was investigated by Emily Hughes Boyce in 1936 [17] and later by V.P.Tsevevich, M.S.Kazanasmas [18]; G.Pojmański [19]; N.N.Samus, E.N. Pastukhova and O.V.Durlevich [20]; D.M.Szczygieł, G.Pojmański and B.Pilecki [21]; G.Torrealba, M.Catelan, A.J.Drake, S.G.Djorgovski, R.H.McNaught, V.Belokurov, S.Koposov, M.J.Graham, A.Mahabal, S.Larson and E.Christensen [22]. The study of the star has been updated by I.I.Baluk. The UCAC4 position of the star: RA = 09h39m10.96s; Dec = -26°33'08".2. The star's catalogue identifiers: the 2MASS identifier – J09391095-2633080; the GSC identifier – 06610-01195; the USNO identifier – B1.0 0634-0256695; the UCAC4 identifier – 318-060956; the ASAS identifier – J093911-2633.1. The star's variability type: R Rab. The peak brightness is 12.81m (in the V band); the minimum brightness is 14.25m (in the V band). The star's ephemerides are plotted in Figure 6.  $M - m = 15\%$ . The Blazhko effect is visible.

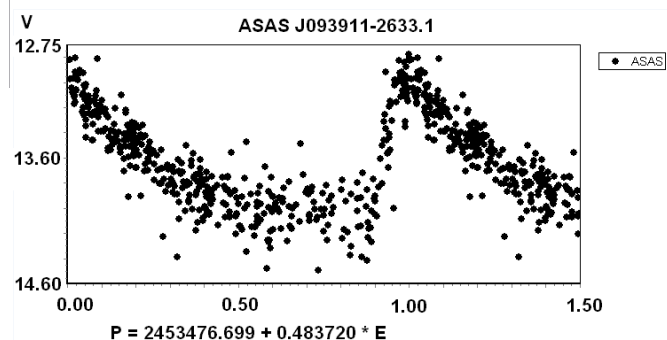


Figure 6

*AL Pic, ASAS J044131-5216.6*

The star was investigated by Willem Jacob Luyten in 1938 [23]. The results were later extended by G.Pojmański [24]; P.Wils and A.Sodor [25]; E.V.Kazarovets, N.N.Samus, O.V.Durlevich, N.N.Kireeva and E.N.Pastukhova [26]. I.I.Baluk has presented the results of his individual study of the star. The UCAC4 position of the star: RA = 04h41m30.80s; Dec = -52°16'37".0. The star's catalogue identifiers: the 2MASS identifier – J04413082-5216370; the

GSC identifier – 08082-00469; the USNO identifier – B1.0 0377-0058120; the UCAC4 identifier – 189-004707; the ASAS identifier – J044131-5216.6. The star’s variability type: RRab. The peak brightness is 12.80m (in the V band); the minimum brightness is 14.11m (in the V band). The star’s ephemerides are depicted in Figure 7.  $M - m = 25\%$ . The Blazhko effect was detected by I.I.Baluk:  $P_1 = 34.1715$  d (Figure 8).

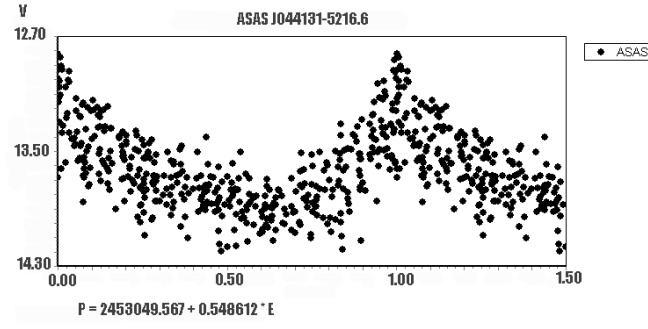


Figure 7

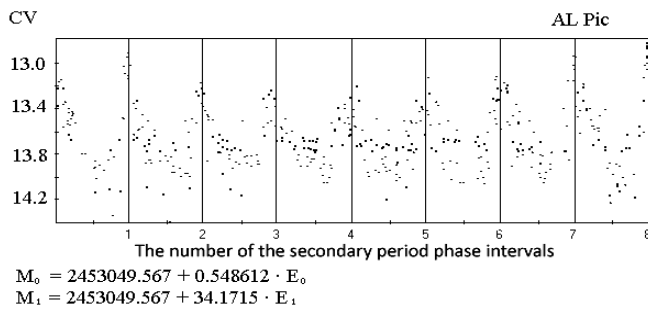


Figure 8

*TW Cae, ASAS J045319-3131.9*

The star was investigated by G.Pojmański in 2002 [27]. Its further study was performed by E.V.Kazarovets, N.N.Samus, O.V.Durlevich, N.N.Kireeva and E.N.Pastukhova [28]; G.Torrealba, M.Catelan, A.J.Drake, S.G.Djorgovski, R.H.McNaught, V.Belokurov, S.Koposov, M.J.Graham, A.Mahabal, S.Larson and E.Christensen [29]. I.I.Baluk has reported the results of his individual study of the star. The UCAC4 position of the star: RA = 04h53m19.31s; Dec = -31°31'56".6. The star’s catalogue identifiers: the 2MASS identifier – J04531930-3131566; the GSC identifier – 07046-01634; the USNO identifier – B1.0 0584-0060796; the UCAC4 identifier – 293-005838; the ASAS identifier – J045319-3131.9. The star’s variability type: RRab. The peak brightness is 12.70m (in the V band); the minimum brightness is 13.75m (in the V band).  $M - m = 25\%$ . The star’s period shows variations. The star’s ephemerides are presented in Figure 9.

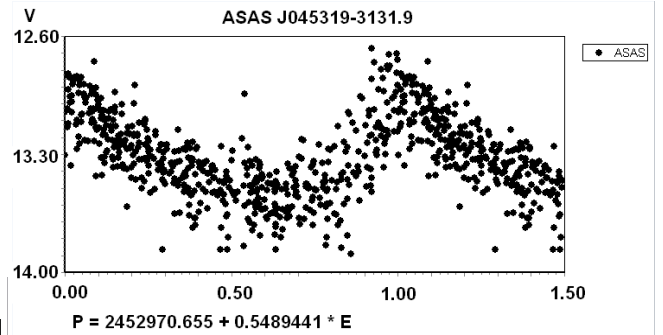


Figure 9

*UZ Ant, ASAS J110520-3856.8*

The star was investigated by Luis E. Erro in 1940 [30]. Further investigations of the star were conducted by N.N.Samus, E.N.Pastukhova and O.V.Durlevich [31]. The results of an individual study of the star have been reported by I.I.Baluk. The UCAC4 position of the star: RA = 11h05m20.16s; Dec = -38°56'46".4. The star’s catalogue identifiers: the 2MASS identifier – J11052026-3856462; the GSC identifier – 07725-00690; the USNO identifier – B1.0 0510-0243867; the UCAC4 identifier – 256-051914; the ASAS identifier – J110520-3856.8. The star’s variability type: RRab. The peak brightness is 13.00m (in the V band); the minimum brightness is 14.40m (in the V band).  $M - m = 21\%$ . The star’s period shows variations. The star’s ephemerides are plotted in Figure 10.

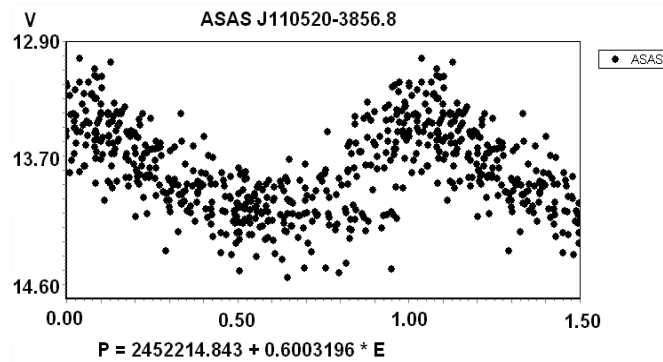


Figure 10

*WY Ant, ASAS J101605-2943.7*

The star was investigated by Cecilia Payne-Gaposchkin [32], as well as by V.P.Tsevevich and M.S.Kazanasmas [33]; J. Lub [34]; G.Pojmański G. [35]; D.M.Szczygieł, G.Pojmański and B.Pilecki [36]; G.Torrealba, M.Catelan, A.J.Drake, S.G.Djorgovski, R.H.McNaught, V.Belokurov, S.Koposov, M.J.Graham, A.Mahabal, S.Larson and E.Christensen [37]. I.I.Baluk has presented the results of his study of the star. The UCAC4 position of the star: RA = 10h16m04.95s; Dec = -29°43'42".4. The star’s catalogue identifiers: the 2MASS identifier – J10160494-2943423; the GSC identifier – 06630-01689; the USNO identifier – B1.0 0602-0242795; the UCAC4 identifier – 302-061329; the ASAS identifier – J101605-2943.7. The star’s variability type: RRab. The peak brightness is 10.31m (in the V band); the minimum

brightness is 11.23m (in the V band).  $M - m = 15\%$ . The star's period shows variations within the interval JD 2451700 – 2455300;  $P = 0.5743448d$ . The star's ephemerides are plotted in Figure 11.

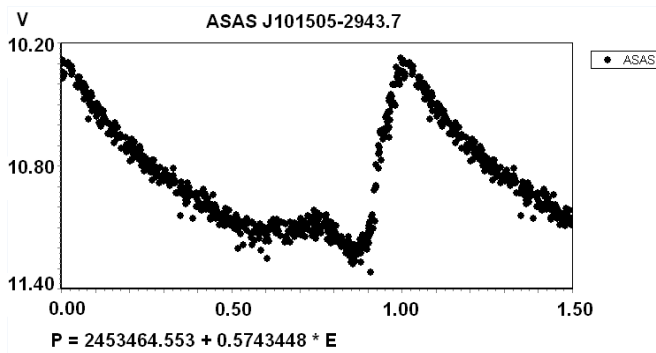


Figure 11

*Acknowledgements.* The authors are grateful to S.M.Andrievsky, N.N.Samus and I.S.Bryukhanov for their kind attention and help.

## References

- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Torrealba G.: [http://nunu.caltech.edu/cgi-bin/getcssconedb\\_id\\_phase.cgi?ID=3041027014747&PER=0.64105&PLOT=plot](http://nunu.caltech.edu/cgi-bin/getcssconedb_id_phase.cgi?ID=3041027014747&PER=0.64105&PLOT=plot)
- Szczygieł D. M., Pojmański G., Pilecki B.: <http://adsabs.harvard.edu/abs/2009arXiv0906.2199S>
- Torrealba G., Catelan M., Drake A.J.: <http://adsabs.harvard.edu/abs/2015MNRAS.446.2251T>
- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Szczygieł D. M., Pojmański G., Pilecki B.: <http://adsabs.harvard.edu/abs/2009arXiv0906.2199S>
- Torrealba G., Catelan M., Drake A.J.: <http://adsabs.harvard.edu/abs/2015MNRAS.446.2251T>
- Strohmeier W., Patterson I.: <http://adsabs.harvard.edu/abs/1969IBVS..330....1S>
- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Samus N.N.: <http://adsabs.harvard.edu/abs/2008IBVS.5863....1K>
- Szczygieł D. M., Pojmański G., Pilecki B.: <http://adsabs.harvard.edu/abs/2009arXiv0906.2199S>
- Strohmeier W., Knigge R., Ott H.: <http://adsabs.harvard.edu/abs/1965IBVS..115....1S>
- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Kazarovets E. V., Samus N. N., Durlevich O. V., Kireeva N. N., Pastukhova E. N.: <http://adsabs.harvard.edu/abs/2008IBVS.5863....1K>
- Szczygieł D.M., Pojmański G., Pilecki B.: <http://adsabs.harvard.edu/abs/2009arXiv0906.2199S>
- Torrealba G., Catelan M., Drake A. J., Djorgovski S. G., McNaught R. H., Belokurov V., Koposov S., Graham M. J., Mahabal A., Larson S., Christensen E.: <http://adsabs.harvard.edu/abs/2015MNRAS.446.2251T>
- Boyce Emily Hughes: <http://adsabs.harvard.edu/abs/1936BHarO.903...28B>
- Tsesevich V.P., Kazanasmas M.S.: <http://adsabs.harvard.edu/abs/1971afcv.book.....T>
- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Samus N.N., Pastukhova E.N., Durlevich O.V.: <http://adsabs.harvard.edu/abs/2007PZ.....27....6S>
- Szczygieł D.M., Pojmański G., Pilecki B.: <http://adsabs.harvard.edu/abs/2009arXiv0906.2199S>
- Torrealba G., Catelan M., Drake A. J., Djorgovski S. G., McNaught R. H., Belokurov V., Koposov S., Graham M. J., Mahabal A., Larson S., Christensen E.: <http://adsabs.harvard.edu/abs/2015MNRAS.446.2251T>
- Luyten Willem Jacob: <http://adsabs.harvard.edu/abs/1938POMin...6....1L>
- Pojmański G.: <http://adsabs.harvard.edu/abs/2002AcA....52..397P>
- Wils P., Sodor A.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2005IBVS.5655....1W&db\\_key=AST&link\\_type=ABSTRACT&high=57c41da3cd31283](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2005IBVS.5655....1W&db_key=AST&link_type=ABSTRACT&high=57c41da3cd31283)
- Kazarovets E.V., Samus N.N., Durlevich O.V., Kireeva N.N., Pastukhova E.N.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2009yCatp018586300K&db\\_key=AST&link\\_type=ABSTRACT&high=57c41da3cd32417](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2009yCatp018586300K&db_key=AST&link_type=ABSTRACT&high=57c41da3cd32417)
- Pojmański G.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2002AcA....52..397P&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d215013](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2002AcA....52..397P&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d215013)
- Kazarovets E.V., Samus N.N., Durlevich O.V., Kireeva N.N., Pastukhova E.N.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2015IBVS.6151....1K&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d219175](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2015IBVS.6151....1K&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d219175)
- Torrealba G., Catelan M., Drake A.J., Djorgovski S.G., McNaught R.H., Belokurov V., Koposov S., Graham M.J., Mahabal A., Larson S., Christensen E.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2015MNRAS.446.2251T&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d220641](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2015MNRAS.446.2251T&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d220641)
- Erro Luis E.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=1940BHarO.913....1E&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d227308](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=1940BHarO.913....1E&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d227308)
- Samus N.N., Pastukhova E.N., Durlevich O.V.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2007PZ.....27....6S&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d210343](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2007PZ.....27....6S&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d210343)
- Payne-Gaposchkin Cecilia: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=1952AnHar.115..189P&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d218654](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=1952AnHar.115..189P&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d218654)
- Tsesevich V.P., Kazanasmas M.S.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=1971afcv.book.....T&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d230043](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=1971afcv.book.....T&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d230043)
- Lub J.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=1977A%26AS...29..345L&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d232538](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=1977A%26AS...29..345L&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d232538)
- Pojmański G.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2002AcA....52..397P&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d201770](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2002AcA....52..397P&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d201770)
- Szczygieł D. M., Pojmański G., Pilecki B.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2009AcA....59..137S&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d202914](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2009AcA....59..137S&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d202914)
- Torrealba G., Catelan M., Drake A.J., Djorgovski S.G., McNaught R.H., Belokurov V., Koposov S., Graham M.J., Mahabal A., Larson S., Christensen E.: [http://adsabs.harvard.edu/cgi-bin/nph-data\\_query?bibcode=2015MNRAS.446.2251T&db\\_key=AST&link\\_type=ABSTRACT&high=57e3e9f7d204020](http://adsabs.harvard.edu/cgi-bin/nph-data_query?bibcode=2015MNRAS.446.2251T&db_key=AST&link_type=ABSTRACT&high=57e3e9f7d204020)