



First Elements for six New Variable Stars in Perseus, Part V

Frank, Peter
Velden, Germany
email: frank.velden@t-online.de

Moschner, Wolfgang
Lennestadt, Germany
email: wolfgang.moschner@t-online.de

Bernhard, Klaus
Linz, Austria
email: klaus.bernhard@liwest.at

Bundesdeutsche Arbeitsgemeinschaft für Veränderliche Sterne e.V.

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Abstract: *6 new variable stars (GSC 03717-00153, UCAC3 285-064742, UCAC3 286-064382, UCAC3 285-064533, UCAC3 285-064904, UCAC3 285-064219) are presented, which were found in a search for new variable stars in the fields of several known variables.*

Introduction

During the investigation of several known variable stars, six further variables were found in their surroundings, which are new to our knowledge (not included in AAVSO VSX and GCVS). This paper is the fourth part of a series dealing with numerous discoveries.

These new variables were discovered on images of the 102mm-TeleVue-Refractor (P. Frank, Velden/Germany) by Peter Frank.

Further detailed observations were made using a 400mm-ASA-Astrograph (W. Moschner, Nerpio/Spain) and the 102mm-TeleVue-Refractor (P. Frank, Velden/Germany) in 2017 and earlier, which are discussed subsequently in detail:

Fr141 Per	=	GSC 03717-00153
Fr238 Per	=	UCAC3 285-064742
Fr269 Per	=	UCAC3 286-064382
Fr270 Per	=	UCAC3 285-064533
Fr271 Per	=	UCAC3 285-064904
Fr272 Per	=	UCAC3 285-064219

Observations

The discovery observations were carried out with a 102mm/5.0 TeleVue-Refractor (Velden/Germany) and a SIGMA 1603 CCD-Camera containing a cooled Kodak KAF1603ME chip. The exposure times were 90 s through an IR & UV cut off filter.

Further observations were carried out between June 2015 and November 2017 with a robotic telescope 400 mm f/3.7 ASA-Astrograph (Nerpio, Spain) equipped with a cooled FLI Proline 16803 CCD-Camera and V-filter. The exposure times were between 60 and 120 seconds. The telescope was controlled from Lennestadt via internet.

Data analysis

Muniwin [1] and a self-written program by F. Agerer were used for the analysis of the frames, after bias, dark- and flatfield correction of the exposures.

Period analysis was performed with Peranso [2], the magnitudes of the variable stars (at maximum brightness) were obtained from the NOMAD 1 Catalog (Zacharias et al. 2015) [3], or the APASS DR9 Catalog (Henden et al. 2016) [4], or the XPM Catalog (Fedorov et. al. 2011) [5].

Presented elements were calculated with Peranso or by taking into account all minima (see tables below) with the method of least squares. The given amplitudes are uncorrected instrumental values.

Explanations:

HJD = heliocentric UTC timings of the observed minima

mag = Magnitude

The coordinates are taken from the USNO-B1.0 catalogue.

Explanations to the lightcurves:

The colour coding of the symbols plots denotes data taken on different nights.

Fr141 Per = GSC 03717-00153

Right ascension: 03h 59m 19.43s (2000)

Declination: +52° 35' 32.0"

APASS DR9 Catalog:

Vmag: 14.414 Bmag: 15.331 Bmag-Vmag = 0.917

Comparison star = GSC 03717-00147

Check Star = GSC 03717-00259

Amplitude Min I: 0.76 mag (instr.) Min II: 0.75 mag (instr.)

Type: EW type eclipsing binary

Min I = HJD 2457327.6427 + 0.4943775*E
±0.0006 ±0.000010

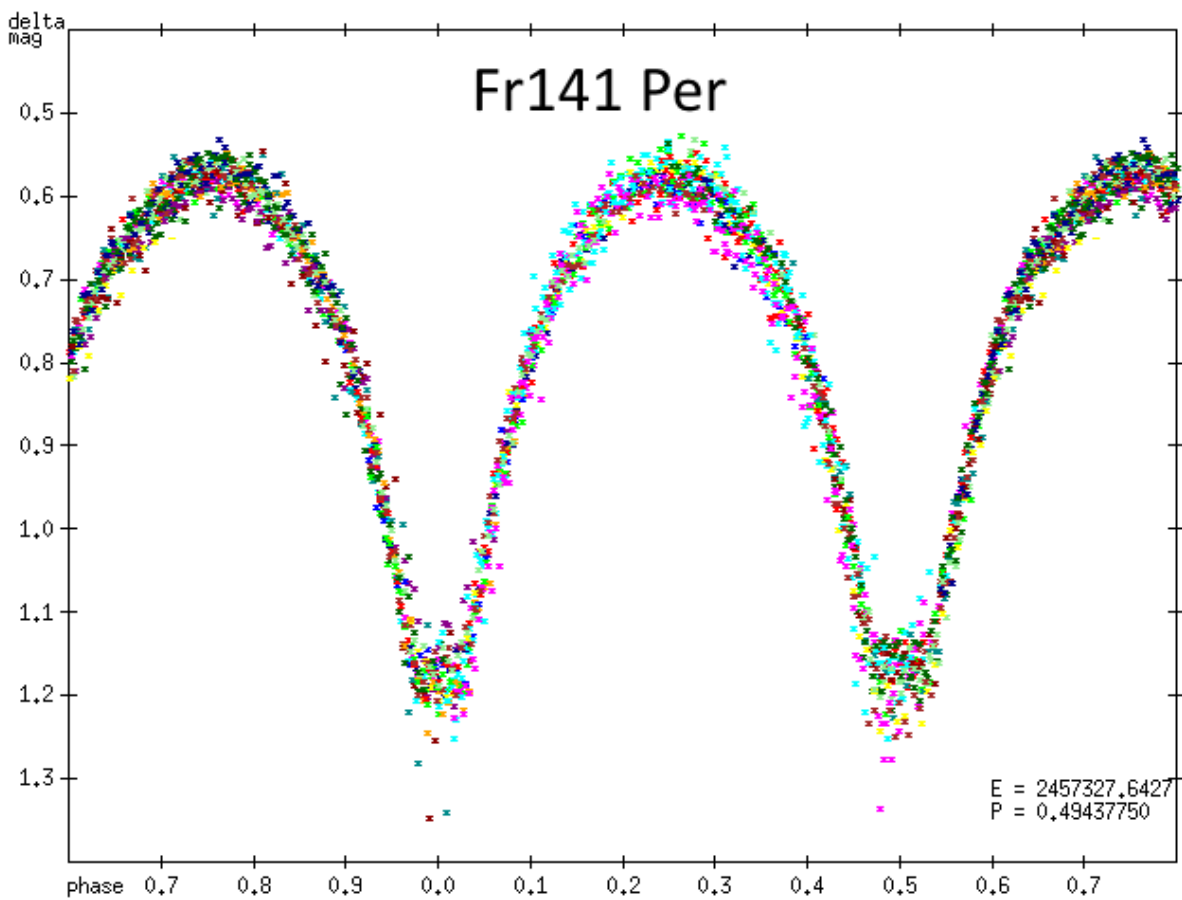


Fig 1: Phased lightcurve of Fr141 Per = GSC 03717-00153 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter. Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

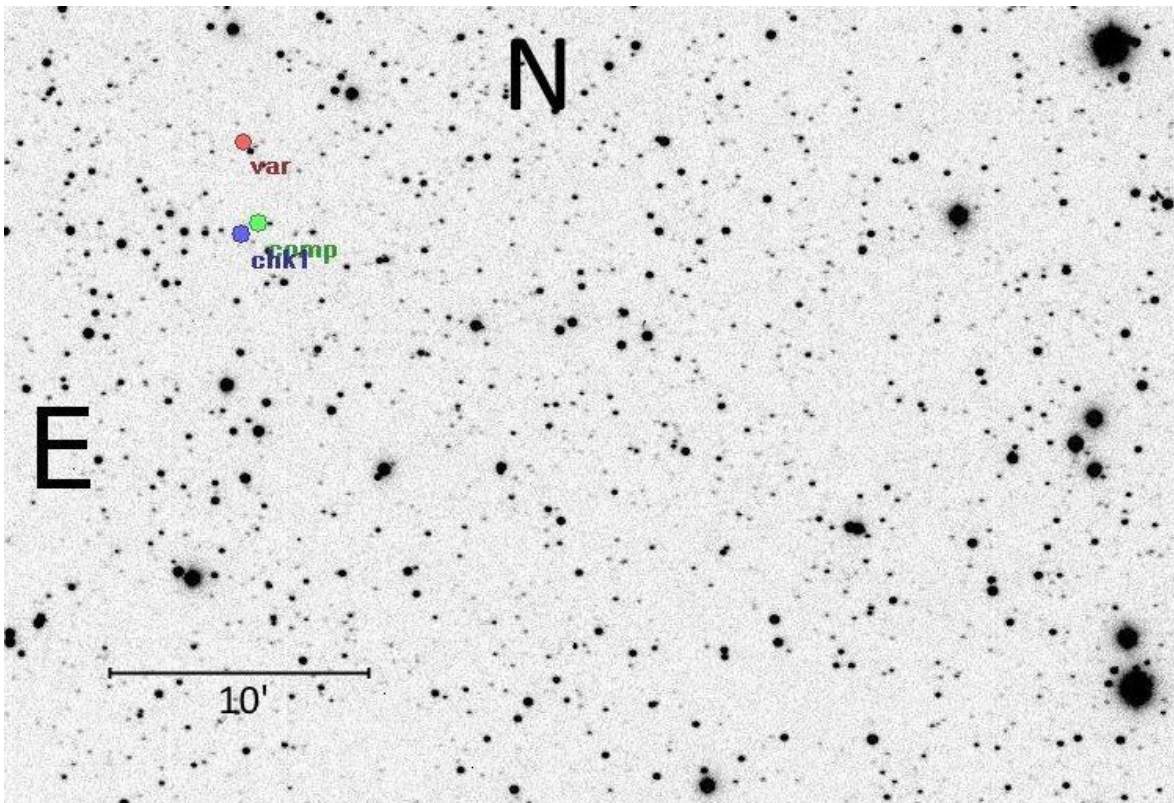


Fig 2: Fr141 Per = GSC 03717-00153 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 1: Minima of Fr141 Per = GSC 03717-00153

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2455807,4293	I	-3075	-0,0026	
P. Frank	2457275,4865	II	-105,5	0,0006	
P. Frank	2457327,3962	II	-0,5	0,0007	
P. Frank	2457327,6427	I	0	0,0000	
P. Frank	2457328,3851	II	1,5	0,0008	
P. Frank	2457328,6306	I	2	-0,0009	
P. Frank	2457329,3733	II	3,5	0,0003	
P. Frank	2457330,6083	I	6	-0,0007	
P. Frank	2457332,3413	II	9,5	0,0020	
P. Frank	2457338,5193	I	22	0,0003	
P. Frank	2457464,3388	II	276,5	0,0007	
P. Frank	2457465,3284	II	278,5	0,0016	
P. Frank	2457466,3162	II	280,5	0,0006	
P. Frank	2457466,5571	I	281	-0,0057	
P. Frank	2457474,4731	I	297	0,0003	
P. Frank	2457657,3934	I	667	0,0009	
P. Frank	2457657,6429	II	667,5	0,0032	
Moschner/Frank	2457703,6172	II	760,5	0,0004	
Moschner/Frank	2457709,5498	II	772,5	0,0005	
Moschner/Frank	2457734,5153	I	823	-0,0001	
P. Frank	2457752,3133	I	859	0,0003	
Moschner/Frank	2457753,3020	I	861	0,0003	

P. Frank	2457800,2699	I	956	0,0023
P. Frank	2457800,5148	II	956,5	0,0000
P. Frank	2457829,4376	I	1015	0,0017
P. Frank	2457838,3348	I	1033	0,0001
P. Frank	2457839,3232	I	1035	-0,0002
P. Frank	2457840,3124	I	1037	0,0002
P. Frank	2457843,2860	I	1043	0,0076
P. Frank	2457844,5091	II	1045,5	-0,0053
Moschner/Frank	2458026,6917	I	1414	-0,0008
Moschner/Frank	2458032,6231	I	1426	-0,0019
P. Frank	2458040,2876	II	1441,5	-0,0003
P. Frank	2458040,5345	I	1442	-0,0006
P. Frank	2458042,5130	I	1446	0,0004
Moschner/Frank	2458047,7016	II	1456,5	-0,0019
Moschner/Frank	2458054,6255	II	1470,5	0,0007
Moschner/Frank	2458076,6238	I	1515	-0,0008
P. Frank	2458080,3327	II	1522,5	0,0003
Moschner/Frank	2458093,4332	I	1549	-0,0002
Moschner/Frank	2458094,4216	I	1551	-0,0006

Remarks: none

Fr238 Per = UCAC3 285-064742

Right ascension: 03h 54m 05.2673s (2000)

Declination: +52° 19' 13.646"

APASS DR9 Catalog:

Vmag: 13.208 Bmag: 13.922 Bmag-Vmag = 0.714

Comparison star = GSC 03338-01185

Check Star = GSC 03338-00874

Amplitude Min I: 0.56 mag (instr.) Min II: 0.18 mag (instr.)

Type: EA type eclipsing binary

Min I = HJD 2457330.3830 + 1.1576484*E
±0.0008 ±0.000013

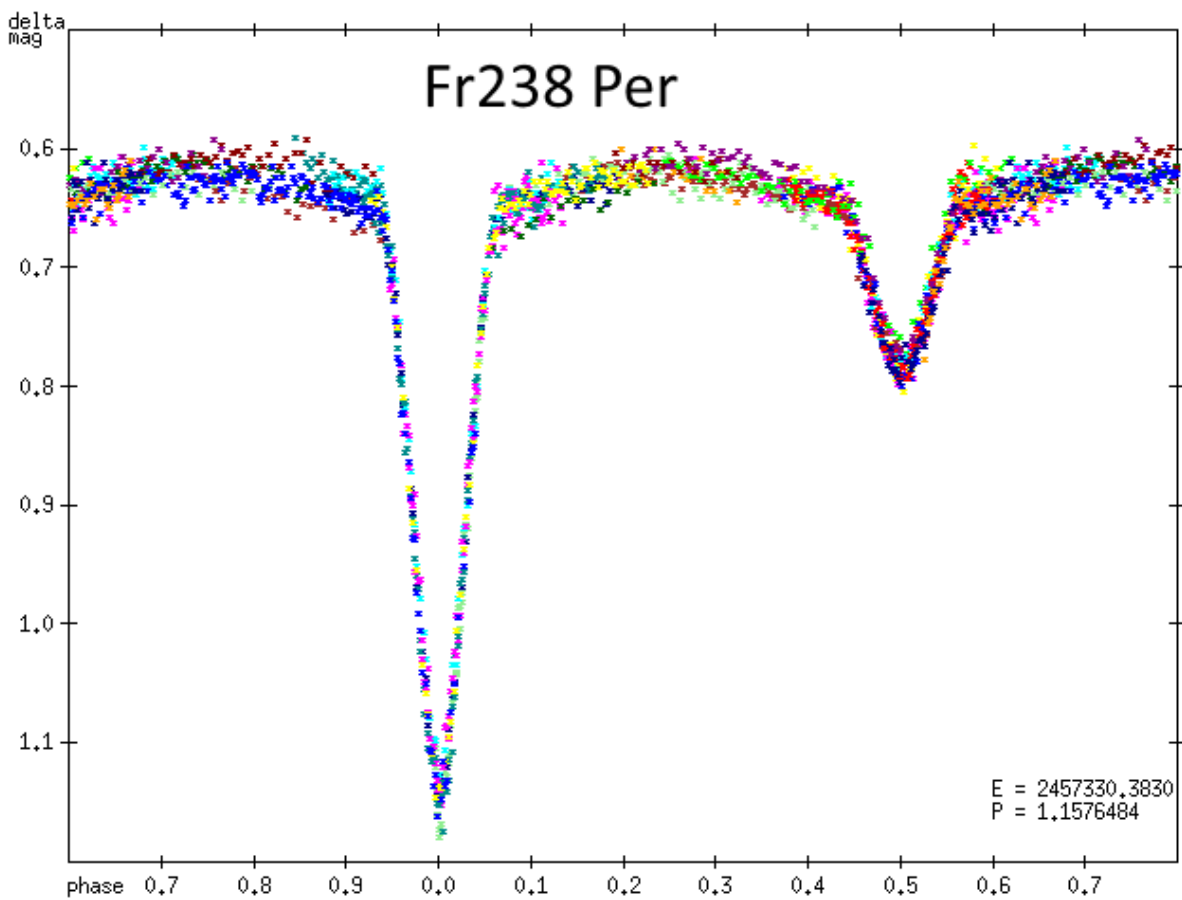


Fig 3: Phased lightcurve of Fr238 Per = UCAC3 285-064742 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter. Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

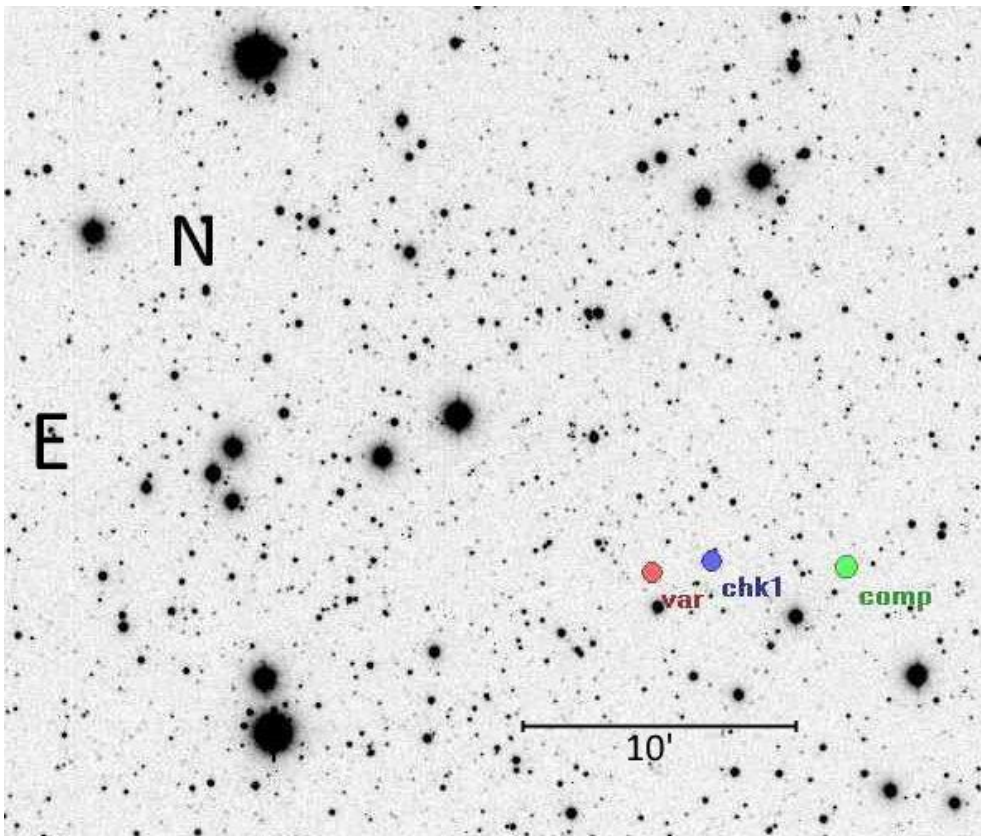


Fig 4: Fr238 Per = UCAC3 285-064742 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 2: Minima of Fr238 Per = UCAC3 285-064742

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2455807,4965	II	-1315,5	0,0000	
P. Frank	2457275,3952	II	-47,5	0,0005	
P. Frank	2457327,4896	II	-2,5	0,0007	
P. Frank	2457328,6471	II	-1,5	0,0006	
P. Frank	2457329,2267	I	-1	0,0013	
P. Frank	2457330,3830	I	0	0,0000	
P. Frank	2457338,4865	I	7	0,0000	
P. Frank	2457466,4052	II	117,5	-0,0015	
P. Frank	2457474,5079	II	124,5	-0,0023	
P. Frank	2457657,4182	II	282,5	-0,0005	
Moschner/Frank	2457734,4023	I	349	0,0000	
P. Frank	2457752,3468	II	364,5	0,0010	
P. Frank	2457800,3891	I	406	0,0008	
P. Frank	2457829,3295	I	431	0,0000	
P. Frank	2457840,3291	II	440,5	0,0020	
P. Frank	2458040,5991	II	613,5	-0,0012	
P. Frank	2458042,3365	I	615	-0,0003	
Moschner/Frank	2458076,4883	II	644,5	0,0009	
Moschner/Frank	2458094,4316	I	660	0,0007	

Remarks: none

Fr269 Per = UCAC3 286-064382

Right ascension: 04h 00m 06.8364s (2000)

Declination: +52° 41' 39.433"

APASS DR9 Catalog:

Vmag: 16.330 Bmag: 17.568 Bmag-Vmag = 1.237

Comparison star = UCAC3 286-064292

Check Star = UCAC3 286-064313

Amplitude Min I: 0.86 mag (instr.) Min II: 0.65 mag (instr.)

Type: EW type eclipsing binary

Min I = HJD 2457338.3576 + 0.2961202*E
±0.0008 ±0.0000018

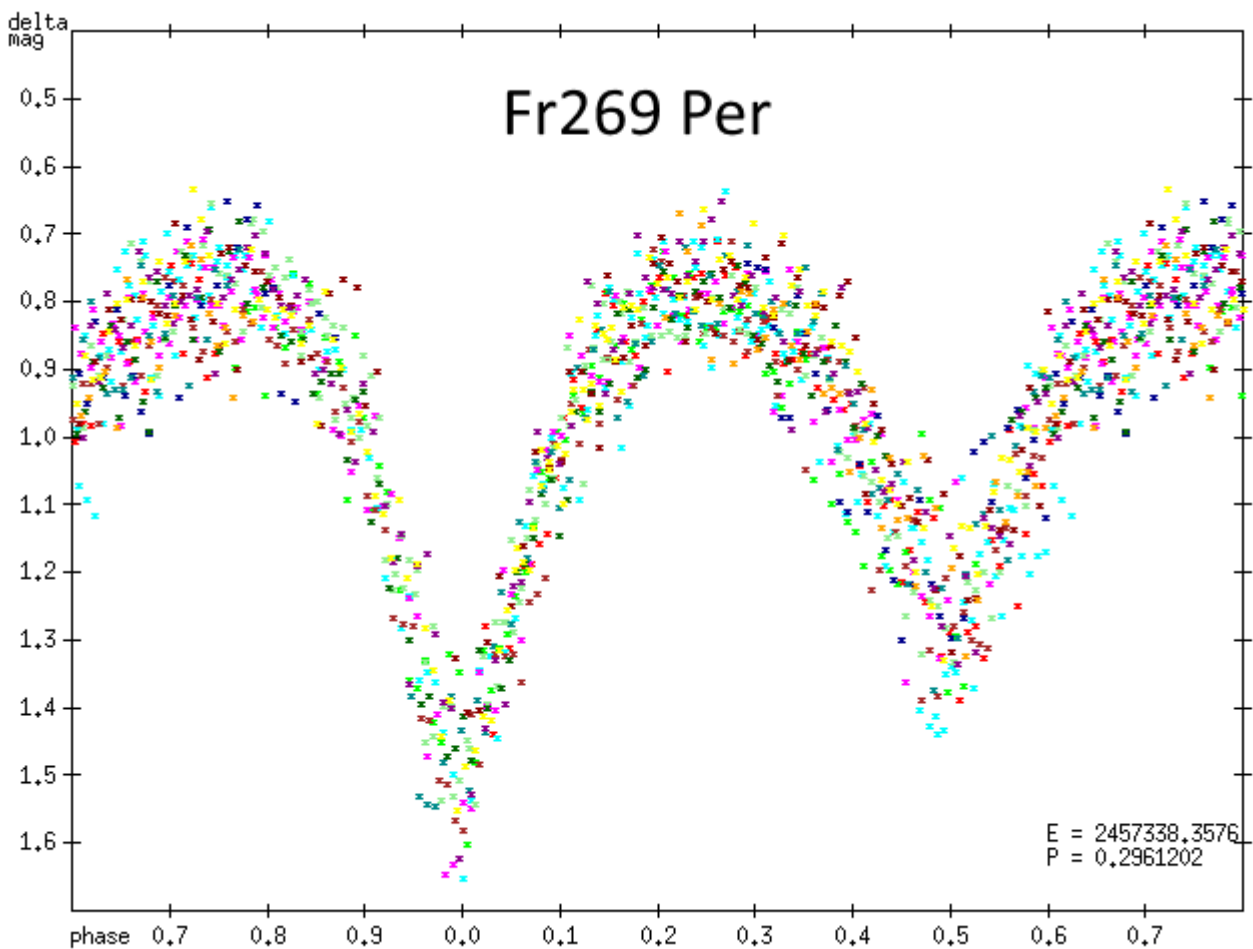


Fig 5: Phased lightcurve of Fr269 Per = UCAC3 286-064382 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter. Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

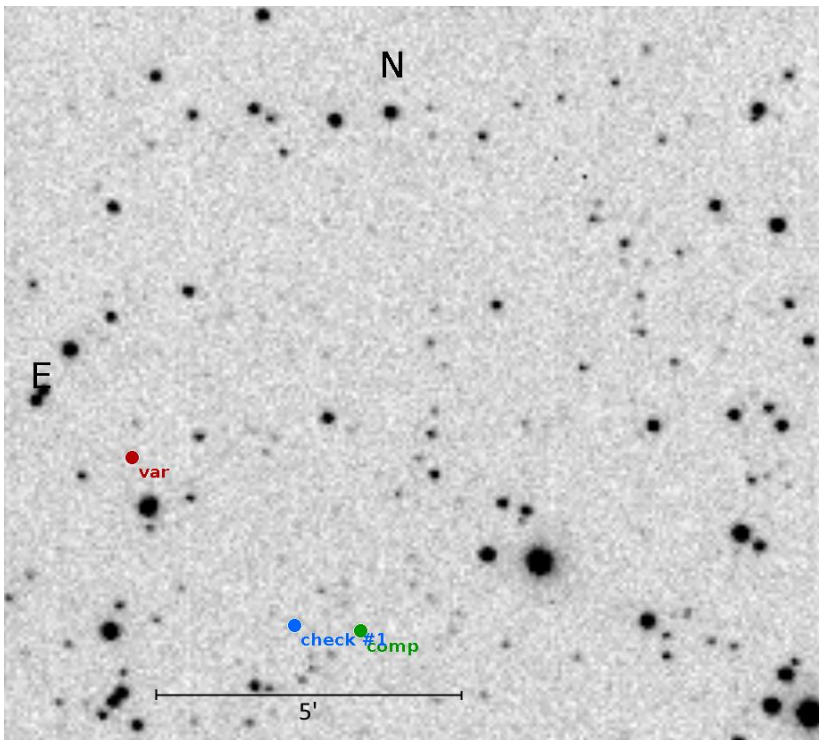


Fig 6: Fr269 Per = UCAC3 286-064382 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 3: Minima of Fr269 Per = UCAC3 286-064382

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2455807,5667	II	-5169,5	0,0025	
P. Frank	2457328,2887	I	-34	-0,0008	
P. Frank	2457329,3221	II	-30,5	-0,0038	
P. Frank	2457329,4750	I	-30	0,0010	
P. Frank	2457329,6177	II	-29,5	-0,0044	
P. Frank	2457330,3610	I	-27	-0,0014	
P. Frank	2457332,2866	II	-20,5	-0,0005	
P. Frank	2457332,4354	I	-20	0,0002	
P. Frank	2457338,3576	I	0	0,0000	
P. Frank	2457338,5036	II	0,5	-0,0021	
P. Frank	2457338,6532	I	1	-0,0005	
P. Frank	2457464,3558	II	425,5	-0,0009	
P. Frank	2457752,3320	I	1398	-0,0016	
P. Frank	2457753,3666	II	1401,5	-0,0035	
P. Frank	2457800,3030	I	1560	-0,0021	
P. Frank	2457840,4322	II	1695,5	0,0028	
P. Frank	2457842,3575	I	1702	0,0033	
P. Frank	2458040,3108	II	2370,5	0,0003	
P. Frank	2458040,4580	I	2371	-0,0006	
P. Frank	2458042,3839	II	2377,5	0,0005	
P. Frank	2458042,5314	I	2378	0,0000	
P. Frank	2458045,3439	I	2387,5	-0,0007	

Remarks: none

Fr270 Per = UCAC3 285-064533

Right ascension: 03h 53m 08.4208s (2000)

Declination: +52° 29' 48.335"

XPM Catalog:

Vmag: 16.795 Bmag: 18.0 Bmag-Vmag = 1.205

Comparison star = UCAC3 285-064535

Check Star = UCAC3 285-064546

Amplitude Min I: 0.74 mag (instr.) Min II: 0.65 mag (instr.)

Type: EW type eclipsing binary

Min I = HJD 2458042.3849 + 0.2422283*E
±0.0009 ±0.000019

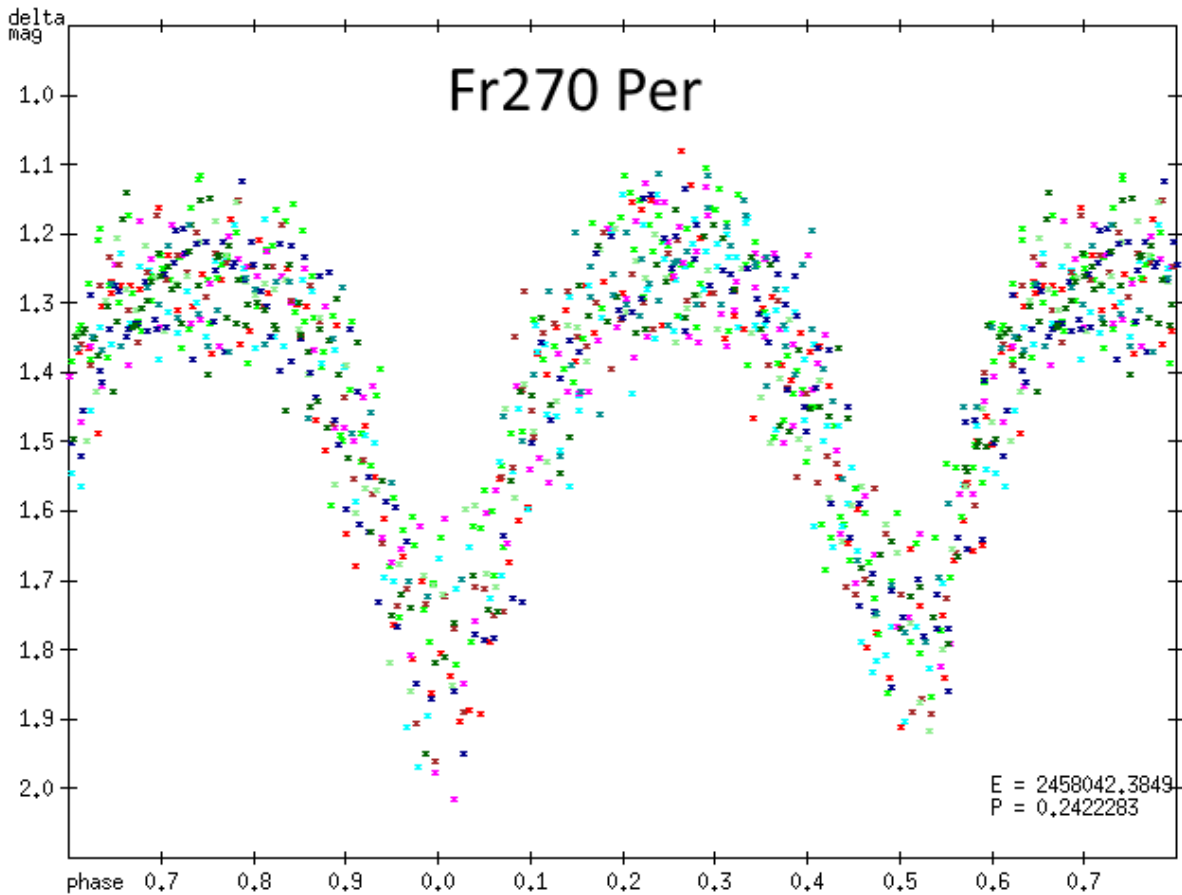


Fig 7: Phased lightcurve of Fr270 Per = UCAC3 285-064533 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter. Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

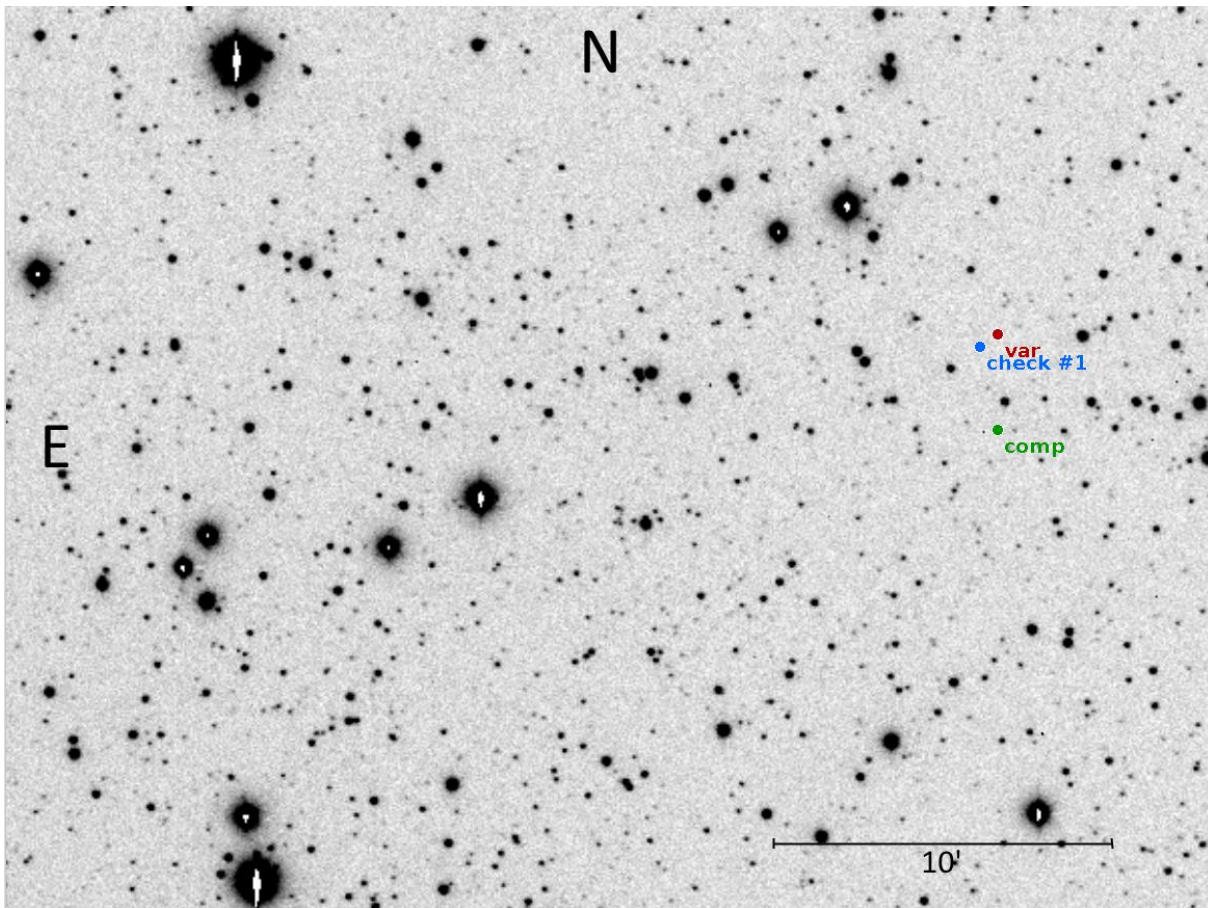


Fig 8: Fr270 Per = UCAC3 285-064533 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 4: Minima of Fr270 Per = UCAC3 285-064533

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2457275,4892	I	-3166	-0,0009	
P. Frank	2457275,6139	II	-3165,5	0,0027	
P. Frank	2457327,3264	I	-2952	-0,0006	
P. Frank	2457327,4473	II	-2951,5	-0,0008	
P. Frank	2457327,5690	I	-2951	-0,0002	
P. Frank	2457328,2936	I	-2948	-0,0023	
P. Frank	2457328,4179	II	-2947,5	0,0009	
P. Frank	2457328,5393	I	-2947	0,0012	
P. Frank	2457329,3869	II	-2943,5	0,0010	
P. Frank	2457329,5077	I	-2943	0,0007	
P. Frank	2457329,6227	II	-2942,5	-0,0054	
P. Frank	2457330,3547	II	-2939,5	-0,0001	
P. Frank	2457330,4763	I	-2939	0,0004	
P. Frank	2457332,2941	II	-2931,5	0,0015	
P. Frank	2457332,4172	I	-2931	0,0034	
P. Frank	2457338,3496	II	-2906,5	0,0013	
P. Frank	2457338,4731	I	-2906	0,0036	
P. Frank	2457338,5919	II	-2905,5	0,0013	
W. Moschner	2457703,5076	I	-1399	0,0001	

W. Moschner	2457703,6270	II	-1398,5	-0,0016
W. Moschner	2457709,5641	I	-1374	0,0009
W. Moschner	2457709,6807	II	-1373,5	-0,0036
W. Moschner	2457734,3881	II	-1271,5	-0,0035
W. Moschner	2457734,5085	I	-1271	-0,0042
P. Frank	2457752,4377	I	-1197	0,0001
W. Moschner	2457753,2836	II	-1193,5	-0,0018
P. Frank	2457753,2857	II	-1193,5	0,0003
W. Moschner	2457753,4032	I	-1193	-0,0033
P. Frank	2457753,4061	I	-1193	-0,0004
P. Frank	2458040,4494	I	-8	0,0023
P. Frank	2458040,5736	II	-7,5	0,0054
P. Frank	2458042,3849	I	0	0,0000
P. Frank	2458042,5074	II	0,5	0,0014

Remarks: none

Fr271 Per = UCAC3 285-064904

Right ascension: 03h 54m 43.6208s (2000)

Declination: +52° 16' 29.390"

APASS DR9 Catalog:

Vmag: 15.881 Bmag: 16.974 Bmag-Vmag = 1.093

Comparison star = UCAC3 285-064912

Check Star = UCAC3 285-064884

Amplitude Min I: 0.45 mag (instr.) Min II: 0.32 mag (instr.)

Type: EA type eclipsing binary

Min I = HJD 2457338.3885 + 2.614357*E
±0.0008 ±0.00012

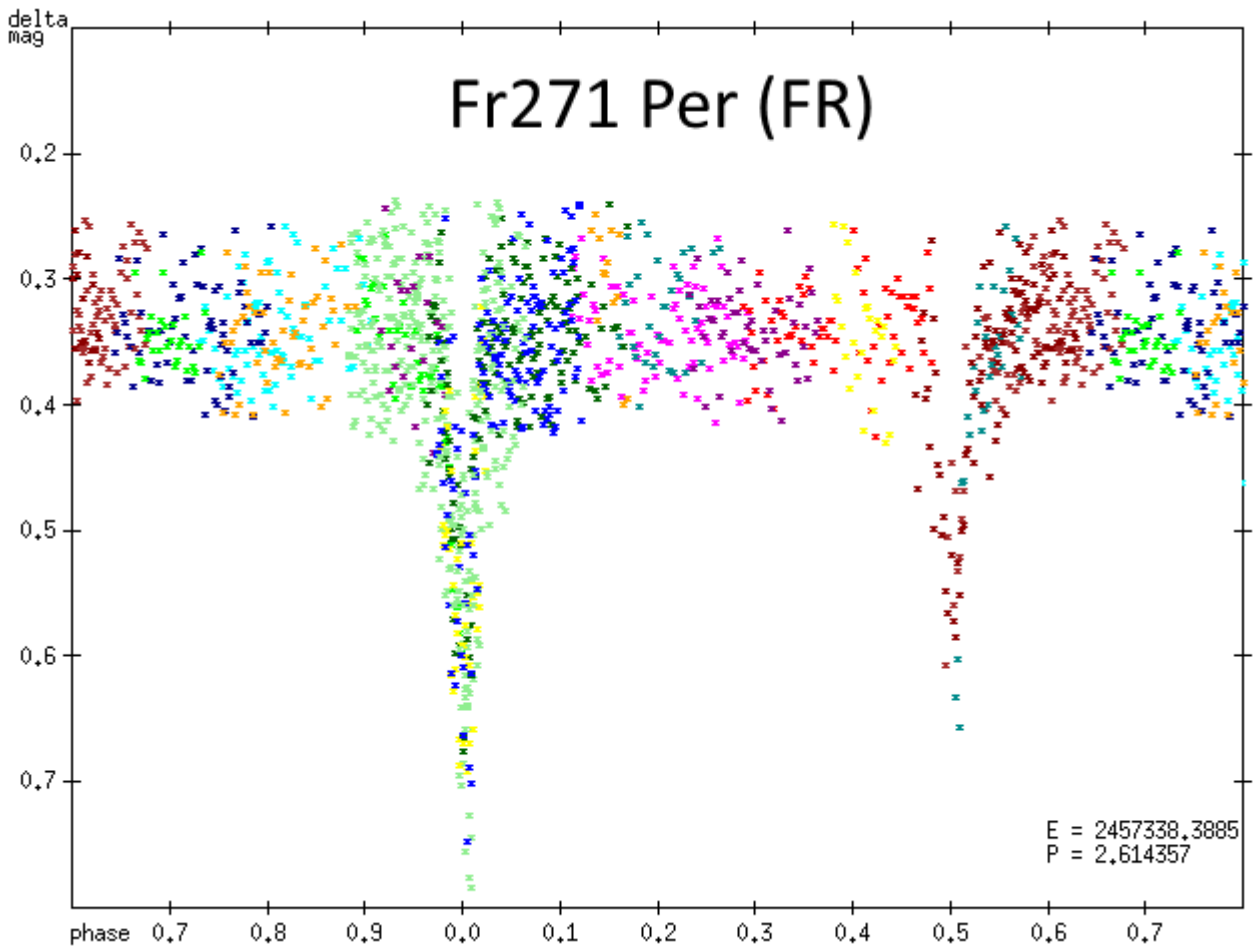


Fig 9a: Phased lightcurve of Fr271 Per = UCAC3 285-064904 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter (FR= Velden, Germany). Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

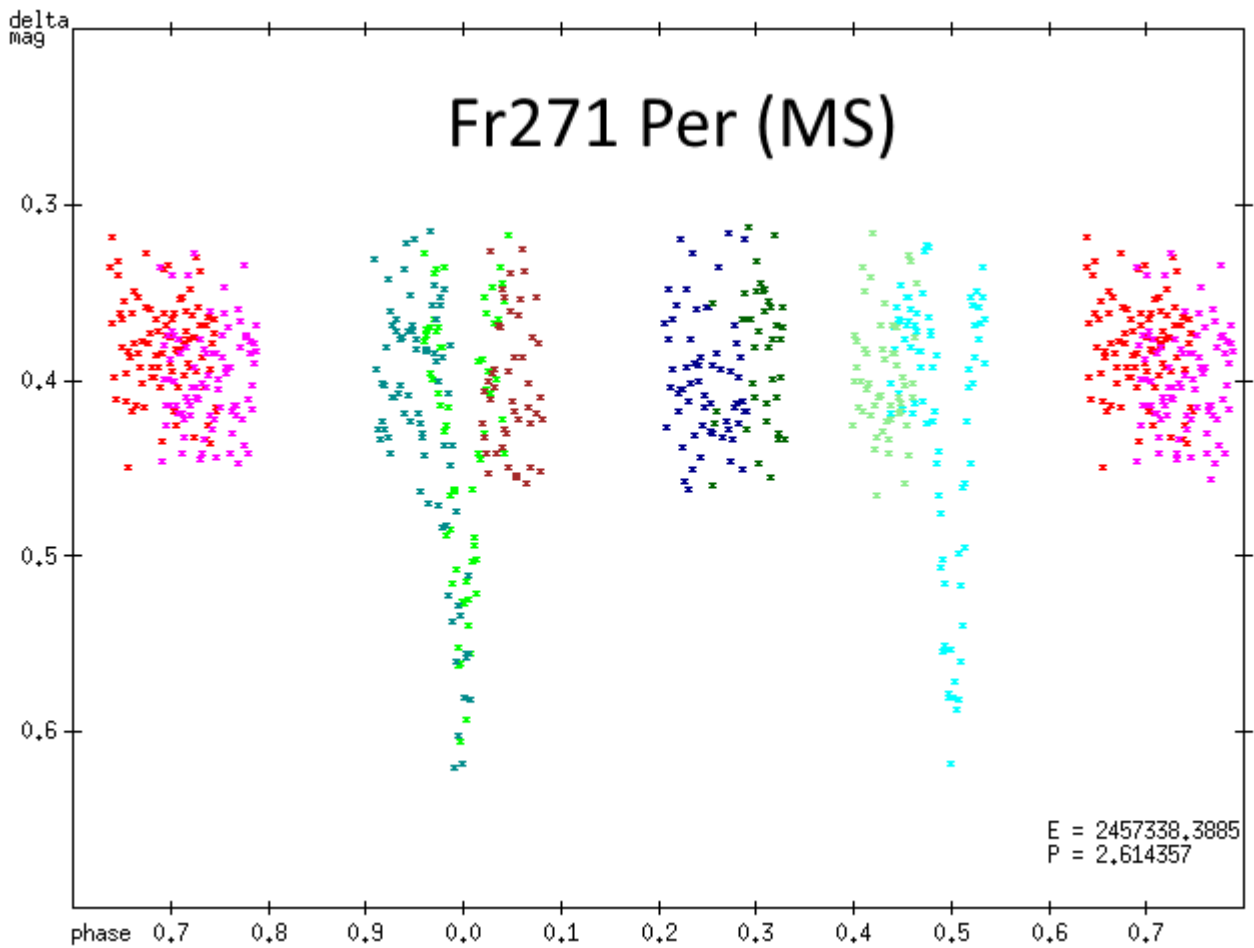


Fig 9b: Phased lightcurve of Fr271 Per = UCAC3 285-064904 using the ephemeris given above. FLI Proline 16803+V-filter (MS= Nerpio, Spain). Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

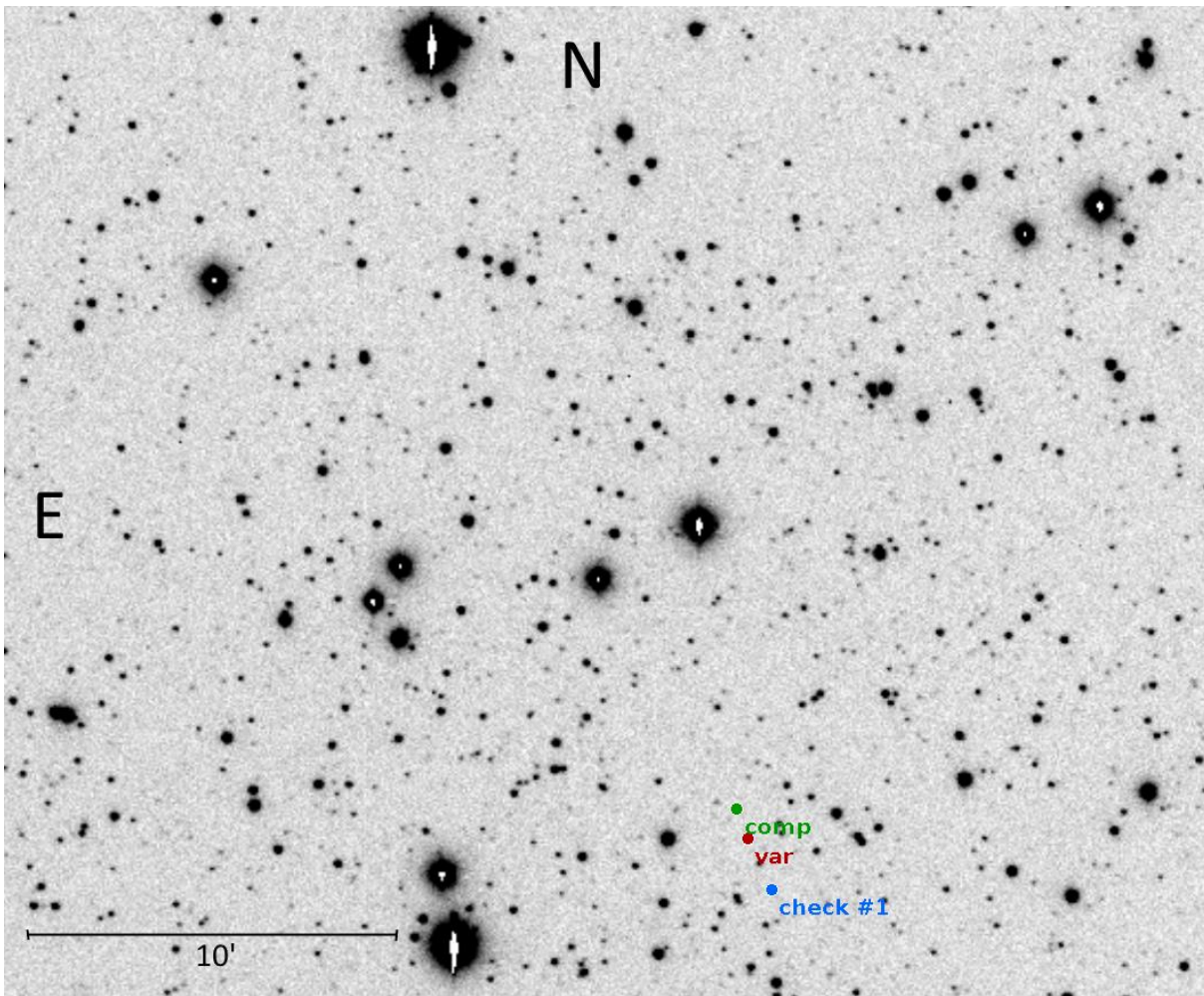


Fig 10: Fr271 Per = UCAC3 285-064904 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 5: Minima of Fr271 Per = UCAC3 285-064904

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2457330,5494	I	-3	0,0040	
P. Frank	2457338,3849	I	0	-0,0036	
P. Frank	2457474,3322	I	52	-0,0029	
P. Frank	2457657,3434	I	122	0,0033	
Moschner/Frank	2457709,6254	I	142	-0,0018	
Moschner/Frank	2457734,4612	II	151,5	-0,0024	
P. Frank	2457840,3462	I	192	0,0012	

Remarks:

The light-curves of both cameras show an elevated scatter!
See Fig. 9a and Fig. 9b.

Fr272 Per = UCAC3 285-064219

Right ascension: 03h 51m 47.2920s (2000)

Declination: +52° 24' 29.948"

APASS DR9 Catalog:

Vmag: 15.596 Bmag: 16.738 Bmag-Vmag = 1.142

Comparison star = UCAC3 285-064207

Check Star = UCAC3 285-064262

Amplitude Min I: 0.27 mag (instr.) Min II: 0.27 mag (instr.)

Type: EW type eclipsing binary

Min I = HJD 2457275.5414 + 0.5019258*E
±0.0013 ±0.0000023

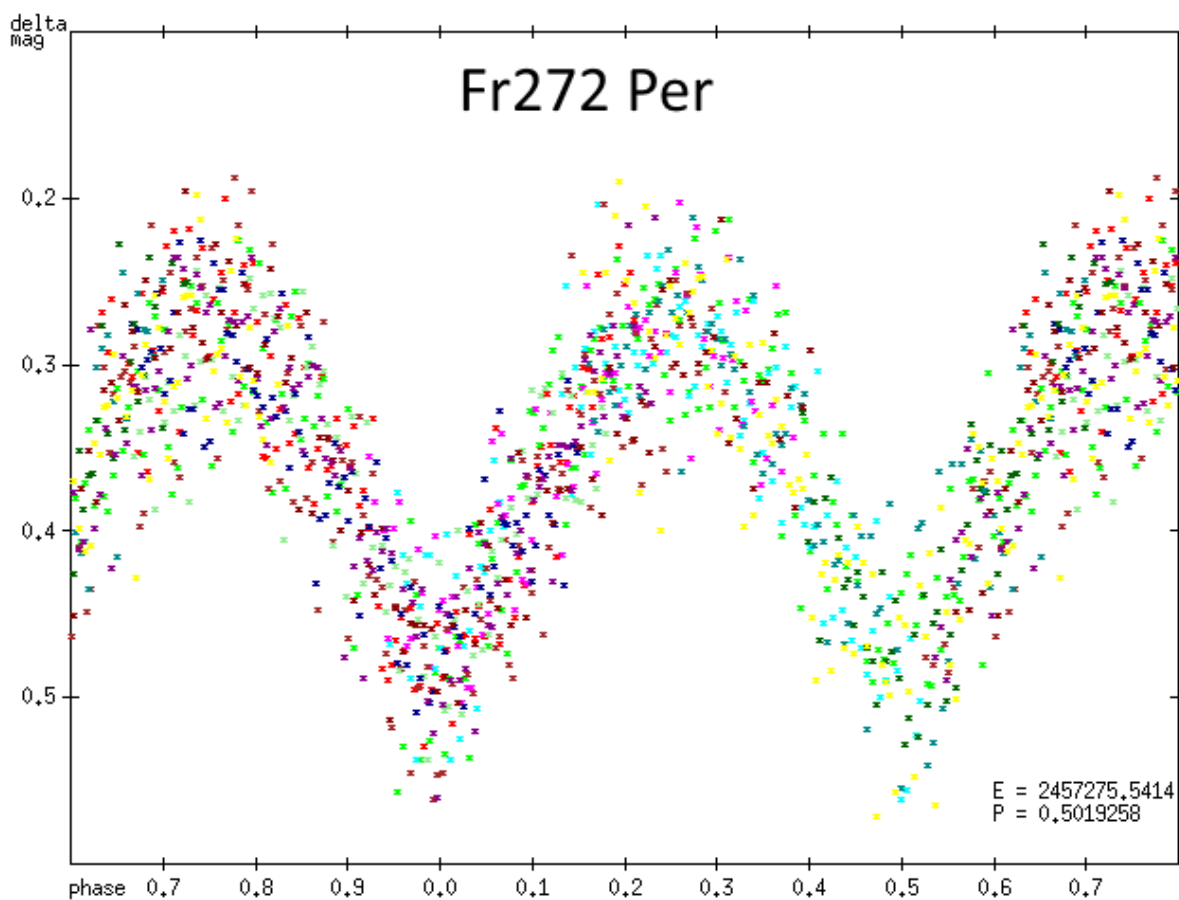


Fig 11: Phased lightcurve of Fr272 Per = UCAC3 285-064219 using the ephemeris given above. SIGMA 1603 CCD-Camera and IR & UV cut off filter. Presented elements were calculated by taking into account all minima (see tables below) with the method of least squares.

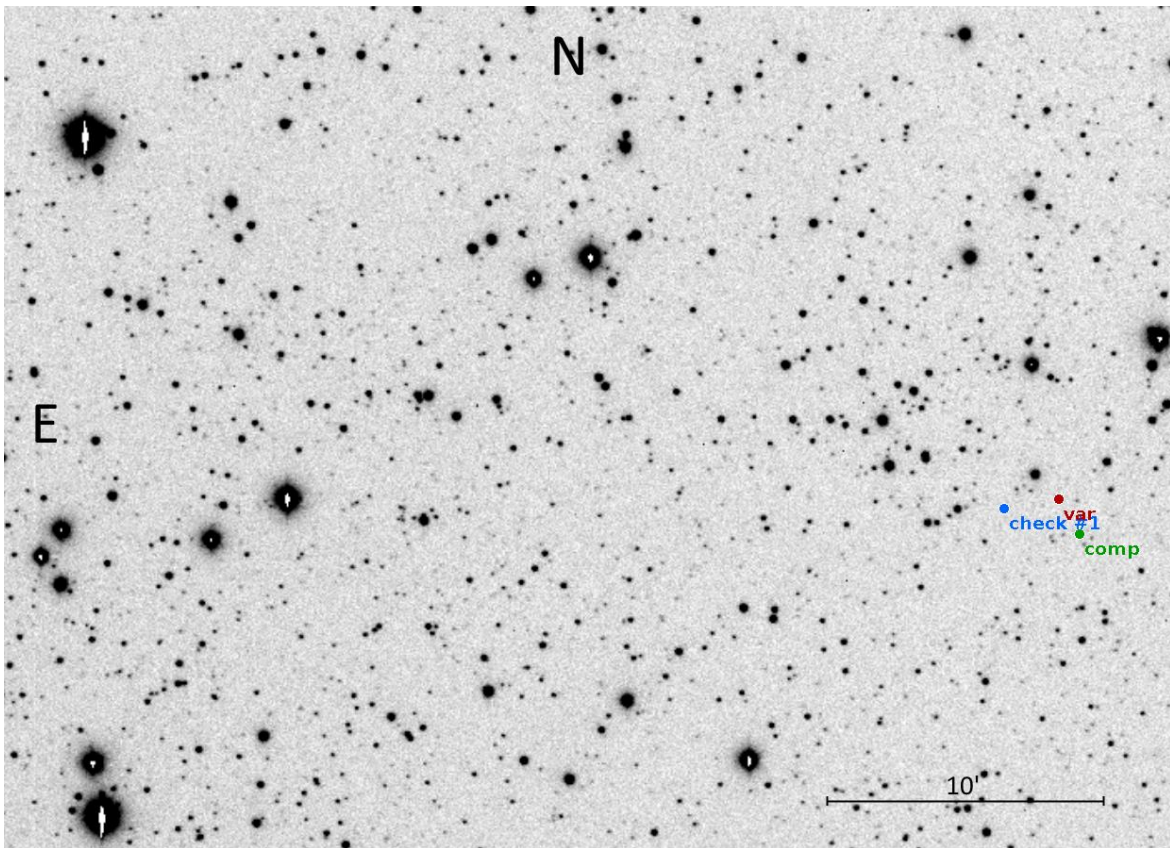


Fig 12: Fr272 Per = UCAC3 285-064219 (**var**) in the field of KQ Per; (**comp**) is the comparison star and (**chk1**) is the check star.

Table 6: Minima of Fr272 Per = UCAC3 285-064219

Observer	HJD-Date Minimum	Type	Epoch	O-C (d)	Source
P. Frank	2457275,5414	I	0	0,0000	
P. Frank	2457328,4979	II	105,5	0,0033	
P. Frank	2457332,2613	I	113	0,0023	
P. Frank	2457657,5039	I	761	-0,0030	
Moschner/Frank	2457703,6864	I	853	0,0023	
Moschner/Frank	2457709,7012	I	865	-0,0060	
P. Frank	2457752,3689	I	950	-0,0020	
Moschner/Frank	2457753,3733	I	952	-0,0015	
P. Frank	2457753,3743	I	952	-0,0005	
P. Frank	2457800,3018	II	1045,5	-0,0030	
P. Frank	2457840,4566	II	1125,5	-0,0023	
Moschner/Frank	2458015,6293	II	1474,5	-0,0017	
Moschner/Frank	2458026,6725	II	1496,5	-0,0009	
P. Frank	2458040,4834	I	1524	0,0071	
P. Frank	2458042,4849	I	1528	0,0009	
Moschner/Frank	2458054,5340	I	1552	0,0038	
P. Frank	2458080,3762	I	1603,5	-0,0032	

Remarks: none

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