

Long-Term Multicolour Photometry of the Young Stellar Objects FHO 26, FHO 27, FHO 28, FHO 29, and V1929 Cygni

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Abstract

Results from long-term multicolour optical photometric observations of the pre-main-sequence stars FHO 26, FHO 27, FHO 28, FHO 29, and V1929 Cyg collected during the period from 1997 June to 2014 December are presented. The objects are located in the dense molecular cloud L935, named ‘Gulf of Mexico’, in the field between the North America and Pelican nebulae. All stars from our study exhibit strong photometric variability in all optical passbands. Using our *BVRI* observations and data published by other authors, we tried to define the reasons for the observed brightness variations. The presented paper is a part of our long-term photometric study of the young stellar objects in the region of ‘Gulf of Mexico’.

Keywords: stars: individual: FHO 26, FHO 27, FHO 28, FHO 29, V1929 Cyg – stars: pre-main sequence – stars: variables: T Tauri, Herbig Ae/Be

1 INTRODUCTION

Pre-main sequence (PMS) stars are newly formed objects located above the main sequence on the Hertzsprung–Russell diagram. Depending on their initial mass, these stars reach the main sequence for different time scales. One of the most important features of the PMS stars is their photometric variability. PMS stars are important objects for study of the early stages of the stellar evolution and for testing the stellar evolution scenarios.

PMS stars with low masses ($M \leq 2 M_{\odot}$) are named T Tauri stars (TTS). The first systematic study of such young stellar objects (YSOs), as a separate class with prototype the star T Tauri, was made by Joy (1942; 1945). TTS are associated with obscured regions, molecular clouds and dark nebulae and are grouped in T associations. These objects show strong irregular photometric variability and emission line spectra. TTS are separated into two subclasses – Classical T Tauri stars (CTTS), which are surrounded by massive accreting circumstellar disks, and weak-line T Tauri stars (WTTS) without evidence for disk accretion (Bertout 1989; Ménard & Bertout 1999).

The more massive ($2 M_{\odot} \leq M \leq 8 M_{\odot}$) PMS stars are known as Herbig Ae/Be stars (HAEBES). The two types PMS stars – TTS and HAEBES are still contracting towards the main sequence and their main characteristic is the

photometric and spectroscopic variability, discovered at the beginning of their study.

TTS show various types of stellar activity. According to Herbst et al. (2007), the variability of WTTS is due to cool spots or groups of spots on the stellar surface. The photometric amplitudes of this variability are about 0.03–0.3 mag, but in extreme cases reach 0.8 mag in the *V*-band. The variability of WTTS can also be due to flare-like variations in *B*- and *U*-band. Flares are random with different sized amplitudes, as there is no periodicity. Usually, the rise of brightness is quick and occurs over short time scales. CTTS often shows irregular variations with larger photometric amplitudes up to 2–3 mag, associated with high variable accretion from the circumstellar disk onto the stellar surface. The variability of CTTS also can be due to rotating hot spots on the stellar surface.

The large amplitude drops in the brightness of the PMS stars are commonly observed in the early types of TTS and HAEBES. These objects show non-periodic deep Algol-type minima and amplitudes up to 2.8 mag in *V*-band. The observed drops in the brightness last from days to some weeks and are caused by circumstellar dust or clouds obscuration (Voshchinnikov 1989; Grinin et al. 1991; Herbst et al. 2007). This group of PMS objects with intermediate mass is known as UXors and their prototype is the star UX Orionis. In very deep minima, the colour indexes of UXors often becomes

Table 1. CCD cameras used and their technical parameters and specifications.

Telescope	CCD Camera	Chip size [pix × pix]	Field [arcmin × arcmin]	Pixel size [μ m]	Scale [arcsec/pix]	RON [e ⁻ rms]	Gain [e ⁻ /ADU]
2-m RCC	Photometrics AT200	1 024 × 1 024	5.28 × 5.28	24	0.31	3.90	4.9
2-m RCC	VersArray 1300B	1 340 × 1 300	5.76 × 5.59	20	0.26	2.00	1.0
1.3-m RC	Photometrics CH360	1 024 × 1 024	8.57 × 8.57	24	0.50	2.60	2.3
1.3-m RC	ANDOR DZ436-BV	2 048 × 2 048	9.64 × 9.64	13.5	0.28	8.14	2.7
Schmidt	SBIG ST-8	1 530 × 1 020	27.52 × 18.35	9	1.08	6.20	2.3
Schmidt	SBIG STL-11000M	4 008 × 2 672	72.00 × 48.00	9	1.08	13.00	0.8
Schmidt	FLI PL16803	4 096 × 4 096	73.80 × 73.80	9	1.08	9.00	1.0
Cassegrain	FLI PL09000	3 056 × 3 056	16.81 × 16.81	12	0.33	8.50	1.0
Cassegrain ^a	FLI PL09000	3 056 × 3 056	26.40 × 26.40	12	0.52	8.50	1.0

^awith focal reducer.

bluer (so called ‘blueing effect’ or ‘colour reverse’) (see Bibo & Thé (1990)). It is generally accepted that the origin of observed drops in the brightness and the bluing effect are due to variations of the column density of dust in the line of sight to the star (Dullemond et al. 2003).

The outbursts of the PMS stars with large amplitude are grouped into two types – FUors, with prototype the star FU Orionis, and EXors, with prototype the star EX Lupi (Herbig 1989). During the quiescence state, the FUors and EXors are normally accreting CTTS. The outbursts of both types of eruptive PMS stars are generally attributed to a sizable increase in accretion rate from the circumstellar disk onto the stellar surface.

The PMS stars included in the present study are located in the dense molecular cloud L935, known as ‘Gulf of Mexico’, between North America (NGC 7000) and Pelican Nebula (IC 5070), in the vicinity of the new FUor star V2493 Cygni (HBC 722) erupted in 2010 (Semkov et al. 2010, 2012, 2014; Miller et al. 2011). NGC 7000 and IC 5070 are thought to be parts of a single large HII region W80. The distance to this region, determined by Laugalys & Straizys (2002) is 600 pc. ‘Gulf of Mexico’ is a region with active star formation and contains many YSO (Armond et al. 2011; Findeisen et al. 2013; Bally et al. 2014). The stars FHO 26, FHO 27, FHO 28, and FHO 29 are revealed as large amplitude variables in the study of Findeisen et al. (2013). V1929 Cyg is reported as flare star from UV Ceti type by Rosino, Tsvetkov, & Tsvetkova (1987).

The present paper is a part of our long-term photometric study of the PMS stars in the region of ‘Gulf of Mexico’. The results from our previous studies of PMS stars in this field have been published in Semkov et al. (2010, 2012, 2014), Poljančić Beljan et al. (2014), and Ibryamov, Semkov, & Peneva (2015).

2 OBSERVATIONS AND DATA REDUCTION

The presented data from photometric observations were performed during the period from 1997 June to 2014 December, in two astronomical observatories, with four telescopes. These are the 2-m Ritchey-Chrétien-Coudé (RCC),

the 50/70-cm Schmidt and the 60-cm Cassegrain telescopes of the Rozhen National Astronomical Observatory of the Bulgarian Academy of Sciences and the 1.3-m Ritchey-Chrétien (RC) telescope of the Skinakas Observatory¹ of the University of Crete (Greece).

The observations were performed with eight different types of CCD cameras Photometrics AT200 and VersArray 1300B at the 2-m RCC telescope; Photometrics CH360 and ANDOR DZ436-BV at the 1.3-m RC telescope; SBIG ST-8, SBIG STL-11000M, and FLI PL16803 at the 50/70-cm Schmidt telescope; FLI PL09000 at the 60-cm Cassegrain telescope. The technical parameters and specifications of the used CCD are summarized in Table 1.

The photometric limit of our data obtained with the 2-m RCC and the 1.3-m RC telescopes in *B*- and *V*-band is about 20.5 mag and for the data collected with the 50/70-cm Schmidt and the 60-cm Cassegrain telescopes is about 19.5 mag.

All frames were taken through a standard Johnson–Cousins set of filters. The total number of the nights used for observations is 292. All frames obtained with the VersArray 1300B, Photometrics CH360, and ANDOR DZ436-BV cameras are bias frame subtracted and flat field corrected. The frames obtained with the SBIG ST-8, SBIG STL-11000M, FLI PL16803, and FLI PL9000 cameras are dark frame subtracted and flat field corrected.

The photometric data were reduced by IDL package (standard subroutine DAOPHOT). As a reference, the *BVRI* comparison sequence reported in Semkov et al. (2010) was used. All data were analysed using the same aperture, which was chosen to have a 4-arcsec radius, while the background annulus was taken from 9 to 14 arcsec.

The average value of the errors in the reported magnitudes are 0.01–0.05 mag for *I*- and *R*-band data, 0.02–0.08 mag for *V*-band data and 0.03–0.11 mag for *B*-band data.

¹Skinakas Observatory is a collaborative project of the University of Crete, the Foundation for Research and Technology, Greece, and the Max-Planck-Institut für Extraterrestrische Physik, Germany.

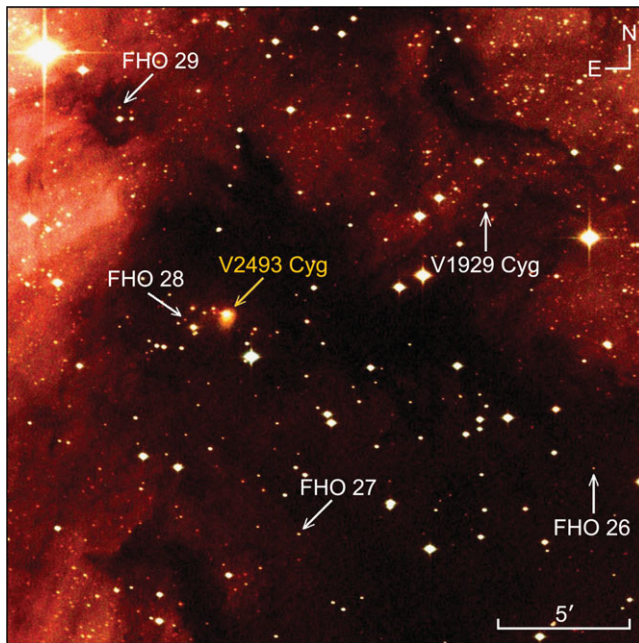


Figure 1. A three-colour image of the field of ‘Gulf of Mexico’, obtained with the Schmidt telescope of Rozhen NAO on 2014 August 19. The program stars and the recently erupting FUor star V2493 Cyg are marked.

3 RESULTS AND DISCUSSION

The results from long-time *BVRI* photometric observations of the PMS stars FHO 26, FHO 27, FHO 28, FHO 29, and V1929 Cyg are presented in the paper. Figure 1 shows a three-colour image of the field of ‘Gulf of Mexico’, with marked positions of the stars from our study and the recently erupting FUor star V2493 Cyg. The image was obtained on 2014 August 19 with the 50/70-cm Schmidt telescope of Rozhen NAO.

The stars from our study shows bursts and/or fades events in their light curves. These events are defined as follows. In the case that the star most of the time spends at high light during our study, the declines in the brightness are interpreted as fades. Respectively, if the star most of the time spends at a low light, the observed increases in the brightness are interpreted as bursts.

3.1. FHO 26

The star FHO 26 (2MASS J20565934+4347530) is included in the list of YSO candidates published in Guieu et al. (2009). The authors measured $B = 20.195$, $V = 18.747$ and $I = 15.963$ mag of the star. According to Findeisen et al. (2013), FHO 26 shows bursts events, which are repeated every few weeks.

Findeisen et al. (2013) presented the light curve in *R*-band of FHO 26 for the period 2009–2012 and described ~ 0.7 mag burst events in 2010 and 2011, lasting 4–5 d each and separated by 10–30 d. During 2012, the star has shown only two short bursts. The spectrum of FHO 26 taken in 2012 July

by Findeisen et al. (2013) shows a M4.5 photosphere with $H\alpha$ in emission.

The *VRI* light curves of FHO 26 from our CCD observations are shown in Figure 2. On the figure, triangles denote CCD photometric data obtained with the 50/70-cm Schmidt telescope and squares—the photometric data collected with the 60-cm Cassegrain telescope. The results of our long-term multicolour CCD observations of the star are summarised in Table A1. The columns contains date (DD/MM/YYYY format) and Julian data (J.D.) of the observations, *IRV* magnitudes of the star, telescope and CCD camera used.

It can be seen from Figure 2 that during our study the brightness of FHO 26 vary around some intermediate level. The star shows both increases in the brightness with different amplitudes and short drops in the brightness. The brightness of the star during the period 2000–2014 vary in the range 15.81–16.18 mag for *I*-band, 17.43–18.54 mag for *R*-band, and 18.47–19.50 mag for *V*-band. In a very low light, the brightness of FHO 26 in *V*-band is under the photometric limit of the 50/70-cm Schmidt and the 60-cm Cassegrain telescopes. The observed amplitudes are $\Delta I \sim 0.40$ mag, $\Delta R \sim 1.10$ mag, and $\Delta V > 1.0$ mag.

The star shows a large amplitude photometric variability during certain periods. The observed increases of the star’s brightness in the period 2010 August–2011 January are with amplitudes up to 0.40 mag for *R*-band and up to 0.65 mag for *V*-band; in the period 2011 June–September with amplitudes up to 0.50 for *R*-band and up to 0.80 mag for *V*-band; in the period 2012 July–2013 January with amplitudes up to 0.40 mag for *R*-band and up to 0.50 mag for *V*-band and in the period 2014 June–August are with amplitudes up to 0.35 for *R*-band and up to 0.40 mag for *V*-band. Usually, variability with such amplitudes is an indication for the presence of hot spots on the stellar surface. The variability is produced by variable accretion from the circumstellar disk and it is typical of CTTS.

In 2002 October, 2006 July, 2009 August, 2013 April, and 2013 August, small amplitude drops in the brightness of FHO 26 are observed. The amplitudes are small ($\Delta R \sim 0.40$ mag) and the drops are caused probably by the existence of cool spots on the stellar surface or by small irregular obscuration of the star by circumstellar material. It can be seen from Figure 2 that during the whole period of observations the total star’s brightness gradually increases (well seen in *R*- and *V*-bands). The rates of increase are $\sim 0.69 \times 10^{-2}$ mag yr $^{-1}$ for *I*-band, $\sim 1.79 \times 10^{-2}$ mag yr $^{-1}$ for *R*-band, and $\sim 3.04 \times 10^{-2}$ mag yr $^{-1}$ for *V*-band

The measured colour indices $V - I$ and $V - R$ versus stellar *V* magnitude for the period of our observations are plotted on Figure 3. From the figure, it is seen that the star becomes redder as it fades and colour reverse was not observed. Such colour variations are typical for both WTTS and CTTS, stars with cool spots, whose variability is produced by rotation of the spotted surface. In case that the decreases in the brightness are caused by obscuration from circumstellar material,

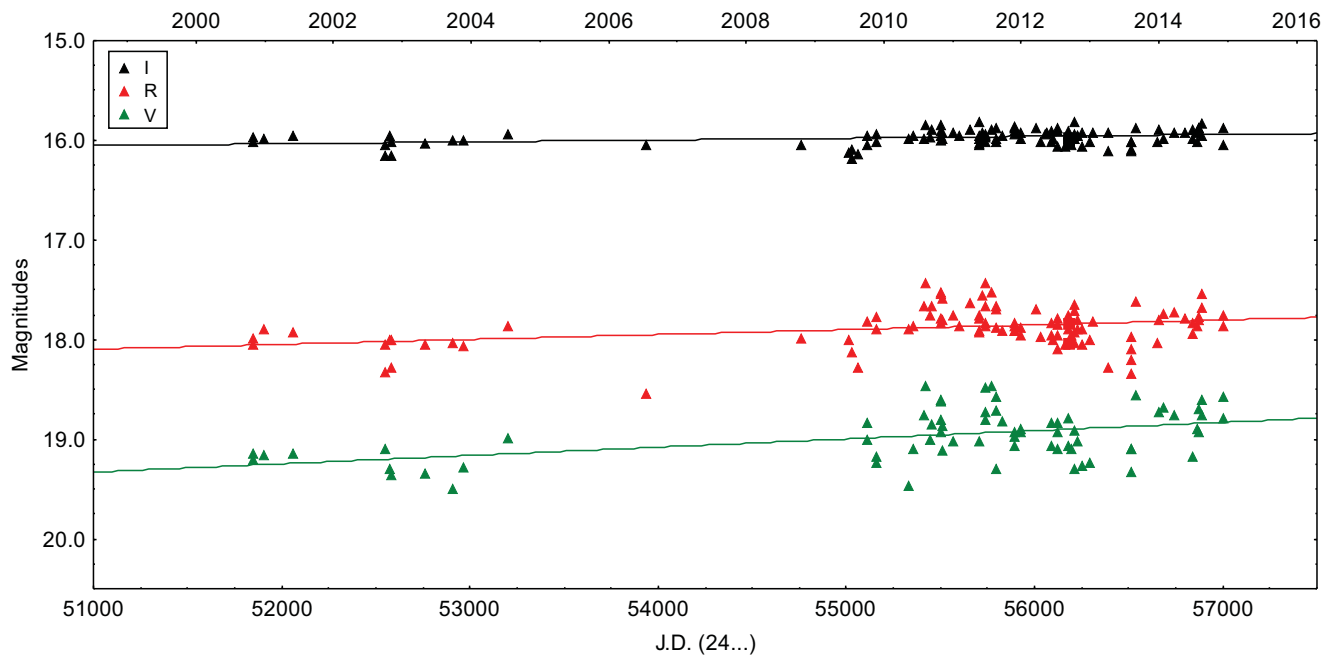


Figure 2. CCD IRV light curves of FHO 26 for the period 2000 October–2014 December.

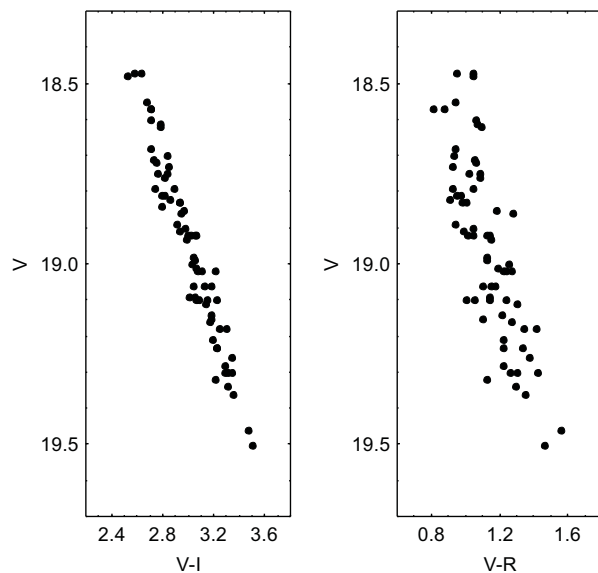


Figure 3. Relationship between V magnitude and $V - I$ and $V - R$ colour indices of FHO 26 in the period 2000 October–2014 December.

the observed amplitudes are too small to show indication for colour reverse.

Therefore, the long-term light curves of FHO 26 gives grounds to predict different reasons for observed variability of the star. The light curves of FHO 26 shows photometric characteristics of both WTTS and CTTS with a presence of hot and cool spots on the stellar surface. Evidences of periodicity in the brightness variability are not detected. The

spectrum with $H\alpha$ emission of FHO 26 (Findeisen et al. 2013) can be classified as a TTS spectrum.

3.2. FHO 27

The star FHO 27 (2MASS J20580138+4345201) is included in the list of YSO candidates by Guieu et al. (2009). The authors measured $B = 20.001$, $V = 18.319$, and $I = 15.759$ mag of the star. Rebull et al. (2011) classify FHO 27 as a flat spectrum source.

Findeisen et al. (2013) presented the light curve in R -band of the star for the period 2009–2012. According to the authors, FHO 27 exhibits a non-periodic multiple fading events, lasting 15–40 d and separated by 30–60 d, as fading events get shallower over the course of the decline. The authors pay attention that FHO 27 was not detected in roughly half the epochs in 2012.

The spectrum of FHO 27 taken in 2012 July by Findeisen et al. (2013) during the stars long-term low state is typical of K7 photosphere with strong $H\alpha$, Paschen series, and CaII emission and weaker HeI, [OI], and OI lines.

The $BVRI$ light curves of FHO 27 from our CCD observations are shown in Figure 4. In the figure, diamond denote CCD photometric data obtained with the 1.3-m RC telescope, the symbols used for the 50/70-cm Schmidt and the 60-cm Cassegrain telescopes, are as in Figure 2. The results of our long-term multicolour CCD observations of FHO 27 are summarised in Table A2. The columns contains date (DD/MM/YYYY format) and Julian data (J.D.) of the observations, $IRVB$ magnitudes of the star, telescope and CCD camera used.

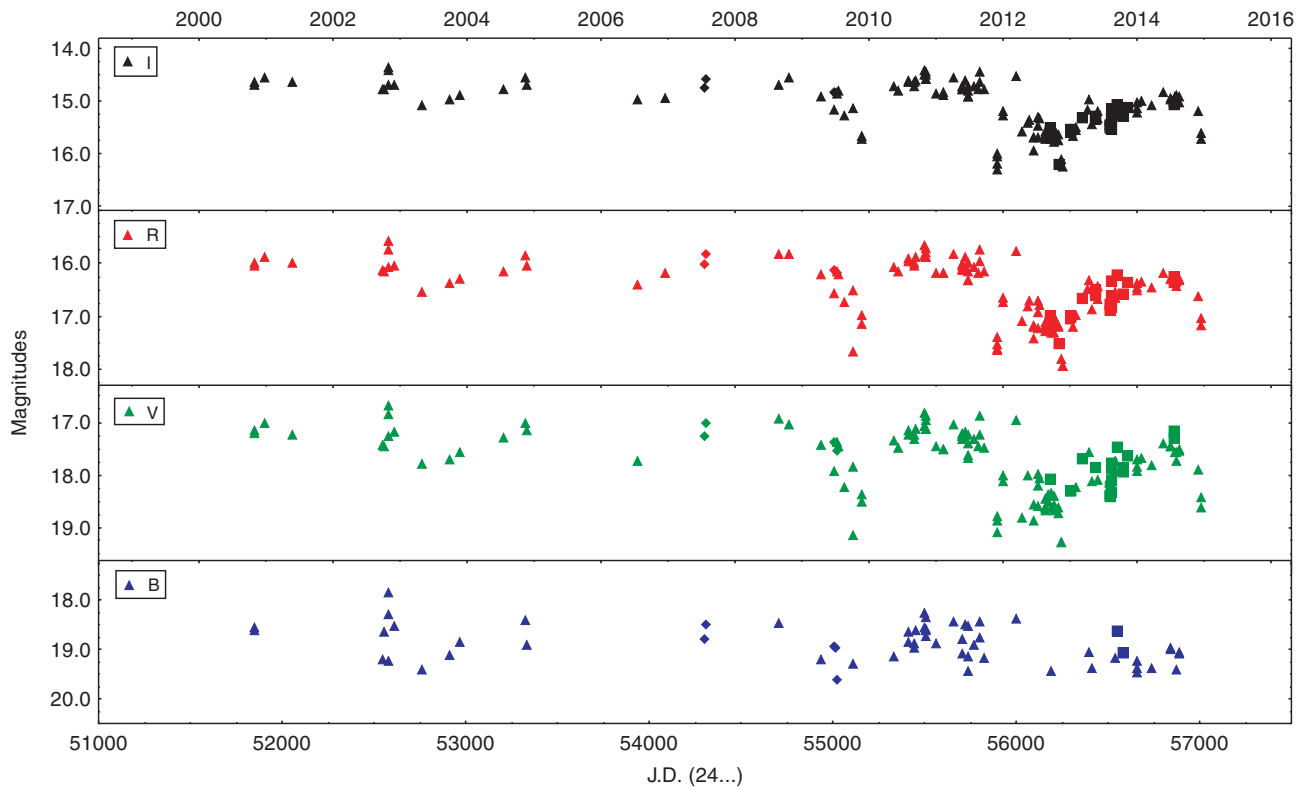


Figure 4. CCD *IRVB* light curves of FHO 27 for the period 2000 October–2014 December.

The brightness of FHO 27 during the period of our observations 2000–2014 vary in the range 14.36–16.31 mag for *I*-band, 15.58–17.93 mag for *R*-band, 16.68–19.26 mag for *V*-band, and 17.84–19.62 mag in *B*-band. Because of the limit of our photometric data, the deeper fading events of FHO 27 in *V*- and *B*-bands are not registered. The observed amplitudes are $\Delta I \sim 1.95$ mag, $\Delta R \sim 2.35$ mag, $\Delta V > 2.6$ mag, and $\Delta B > 1.8$ mag.

It can be seen from Figure 4 that the star usually spends most of the time at high light. During our photometric monitoring, several deep declines in the brightness of FHO 27 are registered. The drops in the brightness are non-periodic and have different duration and amplitudes. It is possible to suggest the existence of a frequent deep fading events during periods with insufficient data. Now we can identify four deep fading events, at the end of 2009–beginning 2010, at the end of 2011, in the period 2012–2013, and in the period 2013–2014.

In the early 2012, the deepest and prolonged drop in the brightness in all bands of FHO 27 begins and reaches the biggest depth in 2012 November with amplitudes 1.82 mag in *I*-band, 2.20 mag in *R*-band, and 2.38 mag for *V*-band. Since 2012 November the star's brightness began to rise, continuing to late 2014, but from 2014 November new drop in the brightness started. During the prolonged fading event, some low amplitude sudden declines are also observed. Evi-

dences of periodicity in the brightness variability of FHO 27 are not detected.

The large amplitudes of observed declines in the brightness of FHO 27 are indication of UXor-type variability and the deep fading events presumably are result of circumstellar dust or clouds obscuration. On Figure 5, the colour indices $V - I$, $V - R$, and $B - V$ versus stellar *V* magnitude during the period of our observations are plotted. The figure shows evidences for colour reversal, especially for $B - V$ index. The different shape of the observed declines gives grounds to predict a variety of obscuration reasons, clouds of proto stellar material, massive dust clumps orbiting the star or planetesimals at different stages of formation.

The light curves of FHO 27 are very similar to light curves of V521 Cyg (HBC 299), which was classified as UXor by Grankin et al. (2007) and Ibryamov et al. (2015). V521 Cyg is located at about 9 arcmin from FHO 27.

3.3. FHO 28

The star FHO 28 (2MASS J20582555+4353287) is included in the list of YSO candidates published in Guieu et al. (2009). The authors measured $B = 21.012$, $V = 19.153$, and $I = 15.932$ mag of the star. Armond et al. (2011) includes FHO 28 in the list of $H\alpha$ emission-line stars and measured $V = 19.58$, $R = 18.11$, and $I = 16.81$ mag of the object.

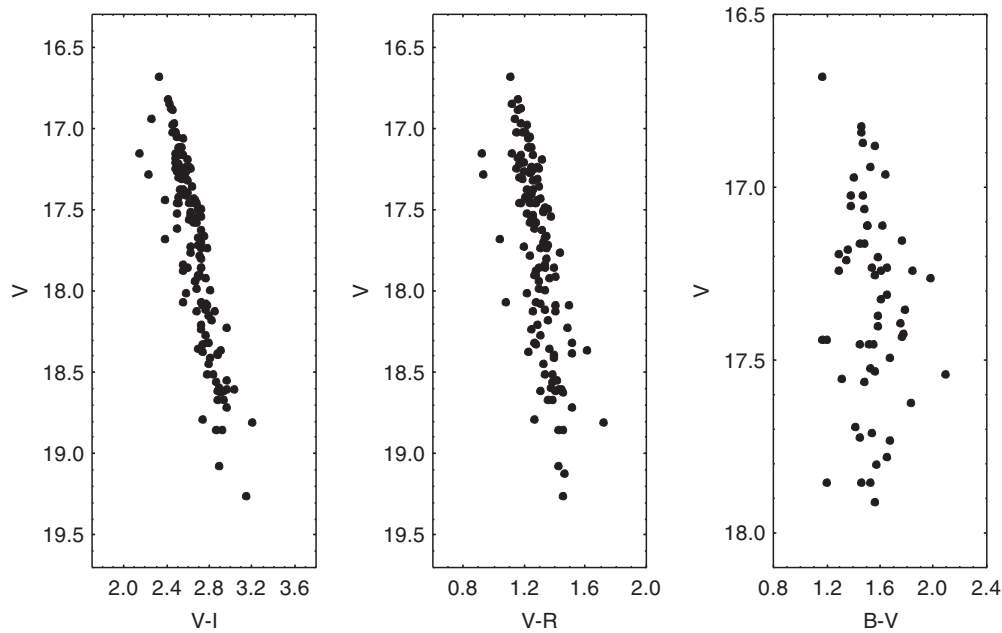


Figure 5. Relationship between V magnitude and the $V - I$, $V - R$, and $B - V$ colour indices of FHO 27 in the period 2000 October–2014 December.

Findeisen et al. (2013) presented the light curve in R -band of FHO 28 for the period 2009–2012 and described fades events of the star. The spectrum of FHO 28 taken in 2012 by Findeisen et al. (2013) during the star's strongly varying phase shows a M3 photosphere with $H\alpha$ in emission and weak emission of CaII, [NII], HeI.

The $BVRI$ light curves of FHO 28 from our CCD observations in the period 1997–2014 are shown in Figure 6. In the figure, circles denote CCD photometric data taken with the 2-m RCC telescope, the other symbols used for the 1.3-m RC, the 50/70-cm Schmidt, and the 60-cm Cassegrain telescopes are as in Figure 4. The results of our long-term multicolour CCD observations of the star are summarised in Table A3. The columns have the same contents as in Table A2.

It can be seen from the Figure 6 that FHO 28 spends most of the time at high light. The star exhibit strong irregular multiple fading in all bands with different amplitudes. The periods of decline in the brightness are relatively short, sometimes we have only one photometric point in the deep minimum. The brightness of FHO 28 during the period of our observations 2000–2014 vary in the range 15.42–17.07 mag for I -band and 16.89–19.38 mag for R -band. The observed amplitudes are 1.65 mag for I - and 2.49 mag for R -bands, respectively. Because of the limit of our photometric data, the deeper drops in the brightness of FHO 28 in V - and especially in B -bands are not registered. We have only some photometric points of the star in B -band collected with the 2-m RCC and the 1.3-m RC telescopes. Evidences of periodicity in the brightness variability of the star are not detected.

Variability with largest amplitude of FHO 28 is observed in 2012 July (2.49 mag in R -band). The measured colour indices $V - I$ and $V - R$ versus the stellar V magnitude dur-

ing the period of our photometric observations are plotted in Figure 7. Irrespective of the large amplitude of variability, the substantial bluing effect is not seen on the figure. This means that the objects causing eclipses have a size significantly larger than the dust particles in the circumstellar environment of UXor variables. It can be supposed that in this case we observe eclipses from a combination of multiple bodies rotating in orbits around the star.

3.4. FHO 29

The star FHO 29 (2MASS J20583974+4401328) is included in the list of YSO candidates by Guieu et al. (2009). The authors measured $B = 18.288$, $V = 16.892$, and $I = 14.890$ mag of the star. Rebull et al. (2011) classify FHO 29 as a flat spectrum source. Findeisen et al. (2013) presented R -band light curve of the star for the period 2011–2012 and described bursting events of the star.

The $BVRI$ light curves of FHO 29 from our CCD observations in the period 2004–2014 are shown in Figure 8. The symbols used for the different telescopes are as in Figure 2. The results of our long-term multicolour CCD observations of the star are summarized in Table A4. The columns have the same contents as in Table A2.

The brightness of FHO 29 during the period of our observations vary in the range 14.29–17.47 mag for I -band, 15.28–18.12 mag for R -band, and 16.27–19.01 mag for V -band. The observed amplitudes are 3.18 mag for I -band, 2.84 mag for R -band, and 2.74 mag for V -band in the same period, because the limit of our photometric data the deep fading events of FHO 29 in B -bands are not registered.

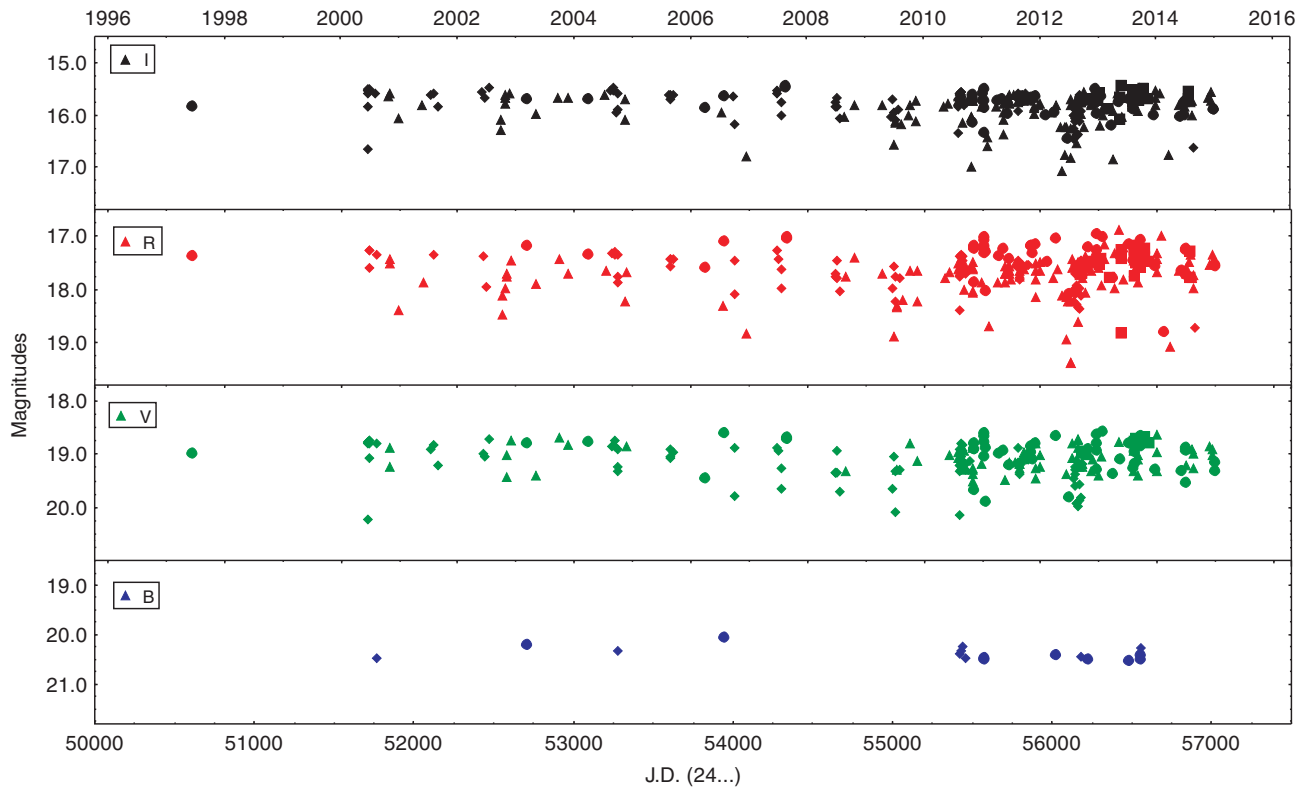


Figure 6. CCD *IRVB* light curves of FHO 28 for the period 1997 June–2014 December.

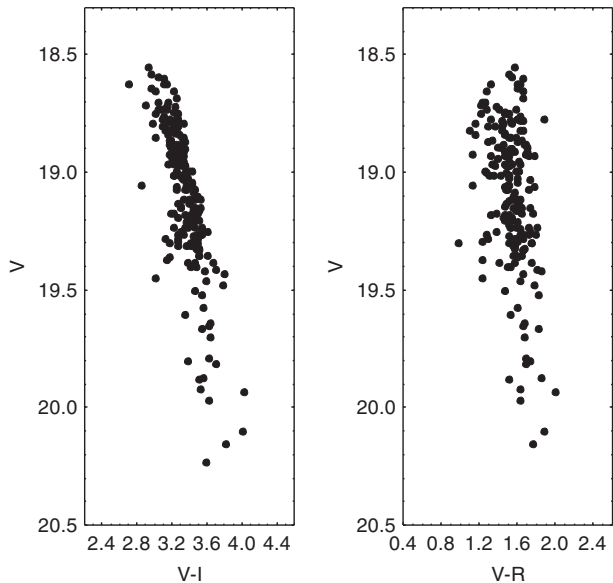


Figure 7. Relationship between *V* magnitude and the *V – I* and *V – R* colour indices of FHO 28 in the period 1997 June–2014 December.

It can be seen from Figure 8, that until the end of 2011 FHO 29 exhibits irregular variations, then in the beginning of 2012 it began to increase its brightness and in mid-2012 the brightness of the star began sharply to drop, reaching amplitudes 3.10 mag for *I*-band, 2.70 mag for *R*-band, and 2.60 mag for

V-band in May 2012. Several sharp increases in brightness for periods of several days or weeks were observed in 2013. At the end of 2013, a gradual drop in brightness started following by a gradual rise by the end of 2014. We can confirm that the long-term light curve of FHO 29 is dominated by burst events. Evidences of periodicity in the brightness variability of the star are not registered. *R*-band images of FHO 29 at maximum (2010 June 10) and at minimum light (2013 May 2) are shown on Figure 9.

The measured colour indices *V – I*, *V – R*, and *B – V* versus the stellar *V* magnitude during the period of our observations are plotted in Figure 10. In contrast to other objects from our study, for FHO 29 we observe an increase of the colour indices against an increase in the brightness of the star. This relationship can be seen in Figure 8 also, the amplitude of the brightness in *I*-band is larger than the amplitudes in *R*- and *V*-bands, respectively. Such a reverse of the colour indices is in a conflict with the bursting nature of the star. On the other hand, the star cannot be classified as UXor, as well as it spends more time at a low light.

3.5. V1929 Cyg

The star V1929 Cygni was discovered and classified as a flare star by Rosino et al. (1987). The authors reported a flare event on 1972 September 4 when the brightness of the star increased from 16.50 mag *pg* to 14.50 mag *pg*. The

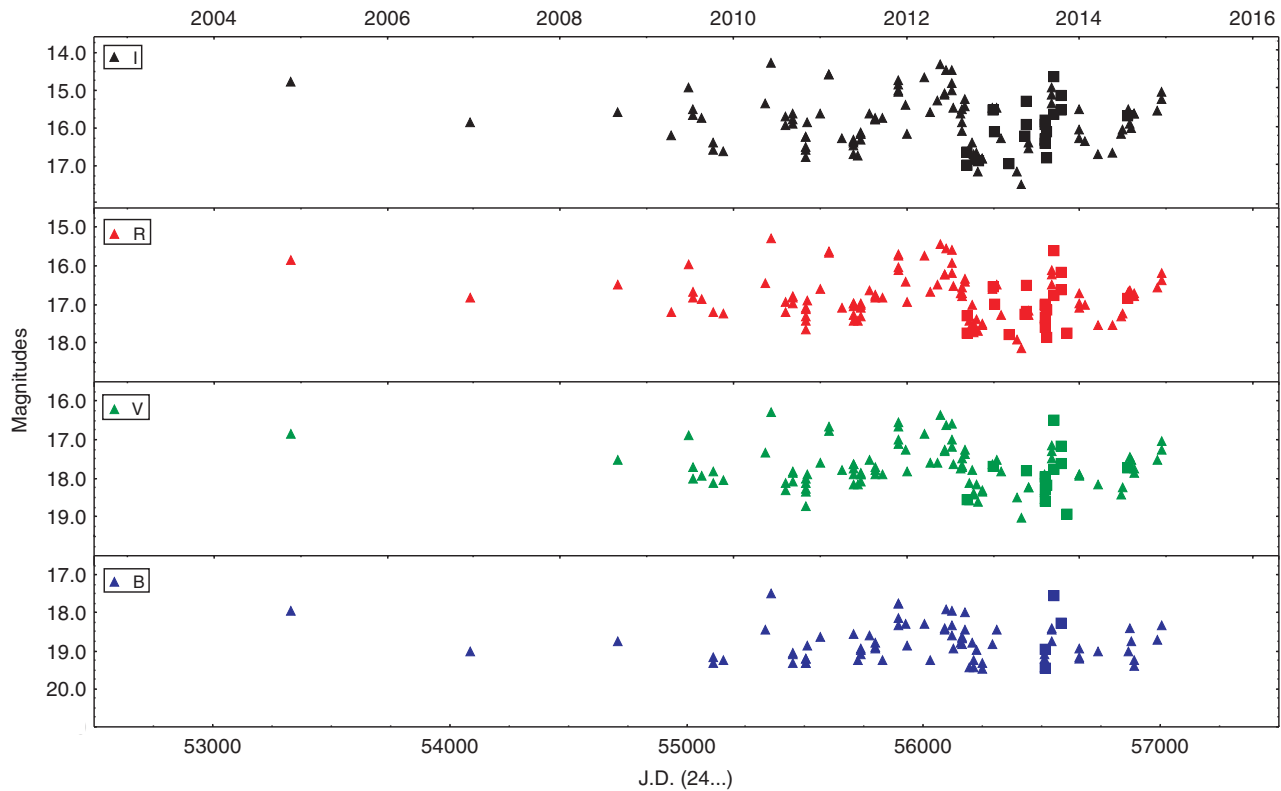


Figure 8. CCD *IRVB* light curves of FHO 29 for the period 2004 November–2014 December.

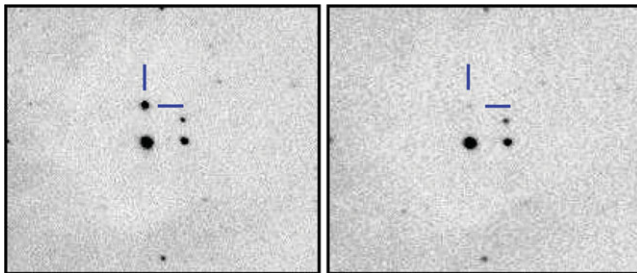


Figure 9. The star FHO 29 at maximum (2010 June 10, the left image) and at minimum light (2013 May 2, the right image). The frames were taken in *R*-band with Schmidt telescope of Rozhen NAO.

magnitudes and colours of V1929 Cyg in quiescence measured by Tsvetkov et al. (1996) are $V = 15.24$ mag, $B - V = 0.92$ mag, $V - R = 0.64$ mag, and $V - I = 1.28$ mag. The authors provide spectrum of V1929 Cyg and estimate its spectral type as dK2–dK5, with $H\alpha$ in emission.

Laugalys et al. (2006) measured $V = 15.111$ mag and $V - U = 3.337$ mag for V1929 Cyg and determined its photometric spectral type as ‘K0V,e?’. From a spectrum taken on 2007 October 22 by Corbally, Straižys, & Laugalys (2009), the authors identify faint $H\alpha$ emission line and OI, CaII and P9 lines. The spectral type is determined as G8e, but on the $J - H/H - K_s$ diagram the star lies close to the K dwarf sequence. The authors suggest that the energy distribution of

the star, constructed from *Spitzer* observations does not show any infrared emission and the authors conclude that the star seems to be a slightly reddened G dwarf with chromospheric activity. The distance to V1929 Cyg determined by Corbally et al. (2009) is 580 pc, i.e., close to the distance of the NGC 7000/IC 5070 complex.

The multicolour *BVRI* light curves of V1929 Cyg from our CCD observations are shown in Figure 11. The symbols used for the different telescopes are as in Figure 6. The results of our long-term photometric observations are summarised in Table A5. The columns have the same contents as in Table A2.

From the Figure 11 can be seen that during the period of our observations V1929 Cyg shows irregular variability in all bands, but flare events are not registered. The brightness of the star during the period 2000–2014 vary in the range of 13.61–13.98 mag for *I*-band, 14.17–14.62 mag for *R*-band, 14.77–15.27 mag for *V*-band, and 15.75–16.26 mag for *B*-band. The observed amplitudes are $\Delta I = 0.37$ mag, $\Delta R = 0.45$ mag, $\Delta V = 0.50$ mag, and $\Delta B = 0.51$ mag in the same period. Usually, such low amplitude variability is typical for low-mass WTTS.

The measured colour indices $V - I$, $V - R$, and $B - V$ versus stellar *V* magnitude during the period of our CCD observations are plotted in Figure 12. The colour variations are typical of WTTS, stars with cool spots, whose variability is produced by rotation of the spotted surface.

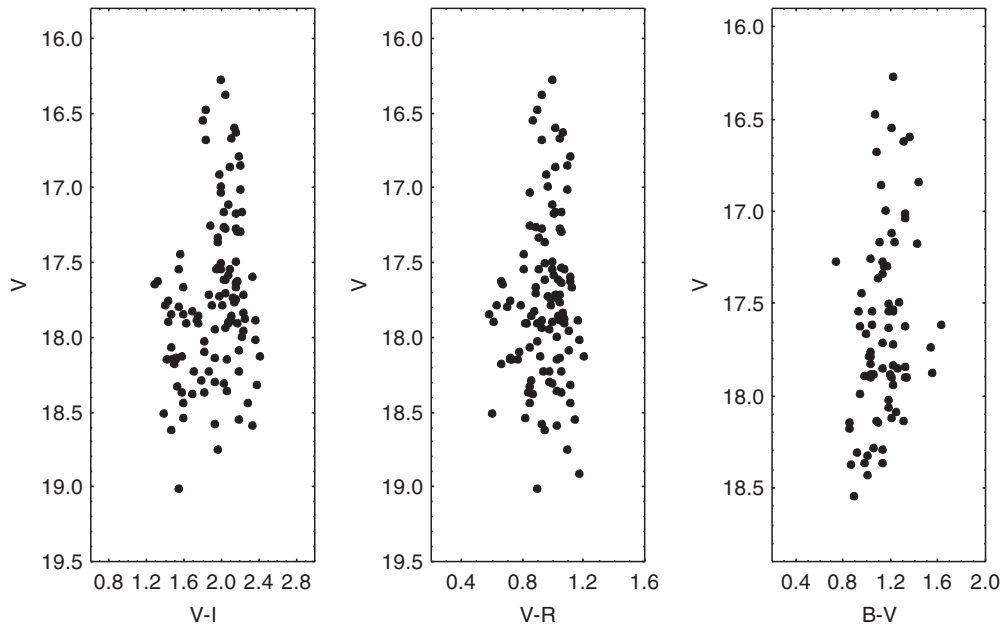


Figure 10. Relationship between V magnitude and the $V - I$, $V - R$, and $B - V$ colour indices of FHO 29 in the period 2004 November–December 2014.

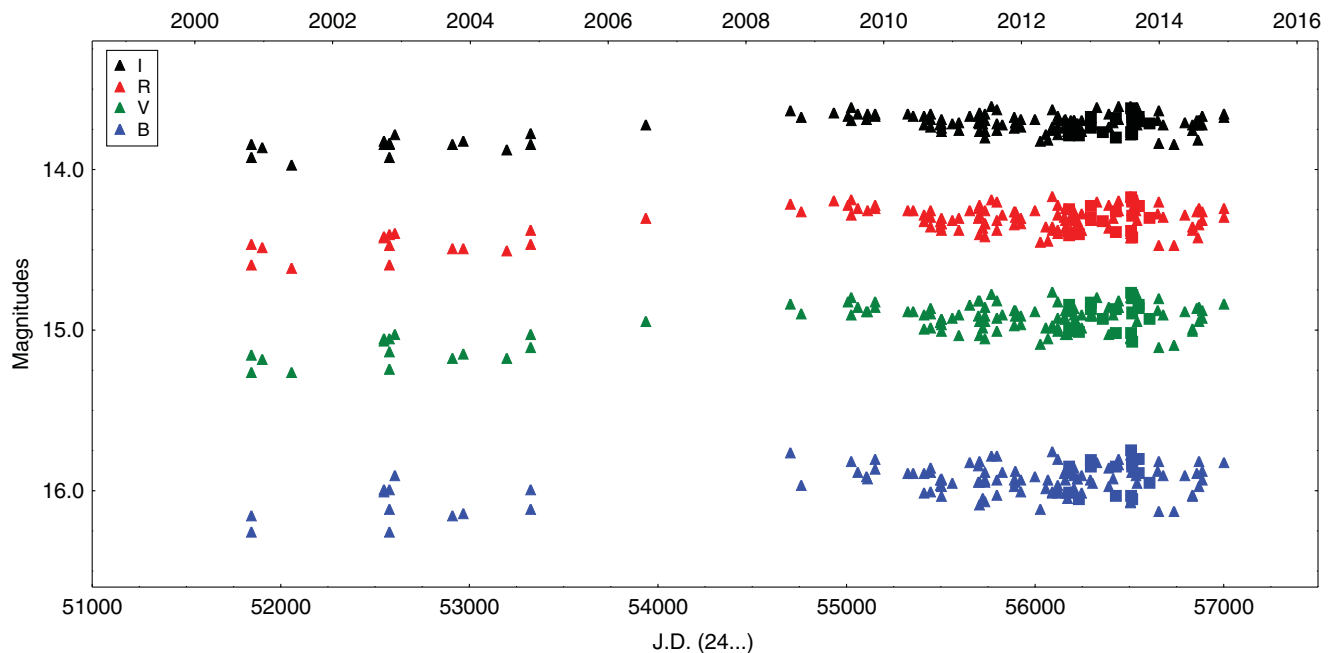


Figure 11. CCD $IRVB$ light curves of V1929 for the period 2000 October–December 2014.

We carried out a periodicity search using our data from 2012 April to 2014 December by PERSEA Version 2.6 (written by G. Maciejewski on the ANOVA technique, Schwarzenberg-Cherny (1996)) and PERIODO4 (Lenz & Breger 2005) softwares. Our time-series analysis of the data indicates a 0.426257 ± 0.000306 day period and led to the ephemeris:

$$JD(\text{Max}) = 2455113.949113 + 0.426257 * E. \quad (1)$$

False Alarm Probability estimation was done by randomly deleting about 10%–15% of the data for about 30 times and then retuning the period of determination. The period and starting age (T_0) determination remain stable, even with a subsample with 30% of the data removed.

Figure 13 exhibits the V -band folded light curve of V1929 Cyg according to the ephemeris (1). The data obtained in BRI -bands show the same shape on periodicity. The found

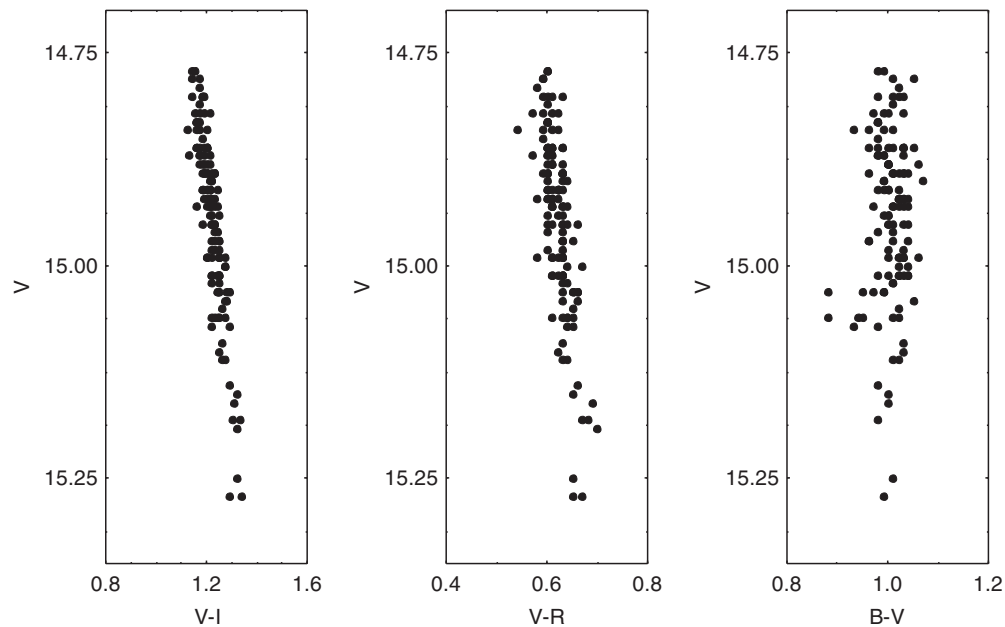


Figure 12. Relationship between V magnitude and the $V - I$, $V - R$, and $B - V$ colour indices of V1929 Cyg in the period 2000 October–2014 December.

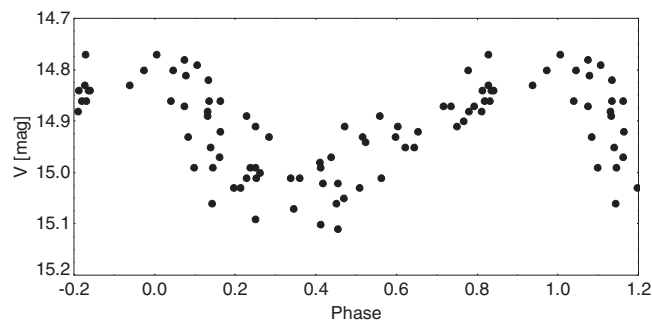


Figure 13. V -band folded curve of V1929 Cyg.

period is stable during time interval of several years and it is typical rotational period of young low-mass star. The periodicity could be caused by rotation modulation of the dark spots on the stellar surface. Such rotation period is extremely short for TTS, but still compatible with the shortest rotation periods of others WTTS (Herbst et al. 2007; Scholz et al. 2011).

4 CONCLUSION

We investigated the long-term photometric behaviour of five PMS stars located in the region of ‘Gulf of Mexico’. The stars FHO 26 and FHO 29 are likely CTTS showing large amplitude bursting events, while FHO 27 and FHO 28 have indications for variable extinction from the circumstellar environment. On the basis of the observed different shapes of

the drops in the brightness, we assume that there is likely to exist a variety of obscuration reasons. V1929 Cyg seems to be WTTS with extremely short rotation period and flare events from UV Cet type.

We are continuing to collect photometric observations of the field of ‘Gulf of Mexico’. The long-term multicolour photometric observations of YSOs are very important for their exact classification. Further regular observations of the YSOs in the same field will be of a great importance and are encouraging.

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APPENDIX. PHOTOMETRIC CCD OBSERVATIONS AND DATA OF THE STARS FROM OUR STUDY

Table A1. Photometric CCD observations and data of FHO 26 during the period 2000 October–2014 December.

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	Tel	CCD
29.10.2000	51847.241	15.97	18.05	19.15	Sch	ST-8
30.10.2000	51848.300	16.02	17.99	19.21	Sch	ST-8
24.12.2000	51903.243	15.99	17.89	19.16	Sch	ST-8
27.05.2001	52057.425	15.96	17.93	19.14	Sch	ST-8
03.10.2002	52551.364	16.04	18.05	19.10	Sch	ST-8
04.10.2002	52552.394	16.16	18.32	–	Sch	ST-8
29.10.2002	52577.288	15.96	18.00	19.30	Sch	ST-8
30.10.2002	52578.284	16.01	18.01	19.36	Sch	ST-8
01.11.2002	52580.193	16.16	18.28	–	Sch	ST-8
06.03.2003	52765.517	16.03	18.05	19.34	Sch	ST-8
27.09.2003	52910.375	16.00	18.04	19.50	Sch	ST-8
25.11.2003	52969.192	16.00	18.06	19.28	Sch	ST-8
17.07.2004	53203.607	15.94	17.87	18.99	Sch	ST-8
19.07.2006	53936.474	16.05	18.54	–	Sch	ST-8
23.10.2008	54763.202	16.04	17.99	–	Sch	STL-11
28.06.2009	55011.458	16.12	18.00	–	Sch	FLI
14.07.2009	55027.412	16.18	18.12	–	Sch	FLI
15.07.2009	55028.380	16.09	–	–	Sch	FLI
21.08.2009	55065.292	16.14	18.28	–	Sch	FLI
06.10.2009	55111.330	16.05	–	18.84	Sch	FLI
08.10.2009	55113.243	15.95	17.82	19.01	Sch	FLI
20.11.2009	55156.197	16.01	17.90	19.23	Sch	FLI
21.11.2009	55157.227	15.94	17.77	19.18	Sch	FLI
13.05.2010	55330.436	15.99	17.90	19.46	Sch	FLI
10.06.2010	55358.424	15.96	17.86	19.10	Sch	FLI
06.08.2010	55415.466	15.99	17.67	18.75	Sch	FLI
07.08.2010	55416.433	15.84	17.43	18.47	Sch	FLI
07.09.2010	55447.420	15.97	17.75	19.00	Sch	FLI
09.09.2010	55449.407	15.89	17.67	18.85	Sch	FLI
31.10.2010	55501.195	15.84	17.53	18.62	Sch	FLI
02.11.2010	55503.223	15.95	17.78	18.93	Sch	FLI
03.11.2010	55504.195	16.00	17.84	18.81	Sch	FLI
04.11.2010	55505.202	15.90	17.54	18.60	Sch	FLI
05.11.2010	55506.226	15.92	17.58	18.86	Sch	FLI
06.11.2010	55507.224	15.98	17.81	19.11	Sch	FLI
01.01.2011	55563.169	15.92	17.75	19.02	Sch	FLI
08.02.2011	55600.671	15.95	17.87	–	Sch	FLI
04.04.2011	55656.509	15.89	17.64	–	Sch	FLI
21.05.2011	55703.384	16.05	17.91	–	Sch	FLI
22.05.2011	55704.430	16.03	17.75	–	Sch	FLI
23.05.2011	55705.408	15.81	17.78	19.02	Sch	FLI
24.05.2011	55706.382	15.99	17.92	–	Sch	FLI
25.05.2011	55707.390	15.96	–	–	Sch	FLI
09.06.2011	55722.425	15.92	17.56	–	Sch	FLI
21.06.2011	55734.420	15.94	17.83	–	Sch	FLI
22.06.2011	55735.452	16.02	17.86	18.81	Sch	FLI
23.06.2011	55736.443	15.96	17.44	18.48	Sch	FLI
24.06.2011	55737.443	15.97	17.66	18.72	Sch	FLI
27.07.2011	55770.361	15.89	17.52	18.47	Sch	FLI
23.08.2011	55797.323	16.02	17.88	19.30	Sch	FLI
24.08.2011	55798.301	15.98	17.66	18.71	Sch	FLI
25.08.2011	55799.318	15.87	17.70	18.57	Sch	FLI
23.09.2011	55828.249	15.96	17.91	18.82	Sch	FLI
27.11.2011	55893.176	15.91	17.84	–	Sch	FLI
28.11.2011	55894.175	15.94	17.86	18.98	Sch	FLI
29.11.2011	55895.167	15.88	17.91	19.06	Sch	FLI
30.11.2011	55896.179	15.86	17.91	18.92	Sch	FLI

Table A1. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	Tel	CCD
29.12.2011	55925.169	15.98	17.95	18.89	Sch	FLI
01.01.2012	55928.185	15.93	17.88	18.92	Sch	FLI
16.03.2012	56003.563	15.88	17.70	–	Sch	FLI
13.04.2012	56030.508	16.02	17.97	–	Sch	FLI
12.05.2012	56060.415	15.94	–	–	Sch	FLI
20.05.2012	56068.399	15.92	–	–	Sch	FLI
12.06.2012	56091.398	16.02	17.96	19.06	Sch	FLI
13.06.2012	56092.383	15.90	17.83	18.83	Sch	FLI
17.06.2012	56096.398	15.98	18.01	–	Sch	FLI
11.07.2012	56120.377	15.90	17.78	18.92	Sch	FLI
12.07.2012	56121.338	15.90	17.85	18.83	Sch	FLI
13.07.2012	56122.399	15.88	17.96	19.10	Sch	FLI
14.07.2012	56123.387	16.06	18.10	–	Sch	FLI
22.08.2012	56162.338	16.06	18.05	–	Sch	FLI
04.09.2012	56175.426	15.90	17.75	18.79	Sch	FLI
05.09.2012	56176.272	15.94	17.89	19.06	Sch	FLI
08.09.2012	56179.272	16.02	18.03	–	60-cm	FLI
09.09.2012	56180.364	15.97	17.84	–	60-cm	FLI
23.09.2012	56194.322	16.04	17.95	19.09	Sch	FLI
07.10.2012	56208.210	15.98	17.92	18.91	Sch	FLI
08.10.2012	56209.204	15.94	17.71	–	Sch	FLI
09.10.2012	56210.193	15.99	18.04	19.30	Sch	FLI
10.10.2012	56211.461	15.81	17.65	–	Sch	FLI
25.10.2012	56226.240	15.95	17.80	19.02	Sch	FLI
26.10.2012	56227.401	15.95	17.90	–	Sch	FLI
17.11.2012	56249.172	15.92	17.89	19.26	Sch	FLI
18.11.2012	56250.181	16.06	18.05	–	Sch	FLI
31.12.2012	56293.254	16.01	18.01	19.23	Sch	FLI
16.01.2013	56309.243	15.92	17.82	–	Sch	FLI
10.04.2013	56392.510	15.92	–	–	Sch	FLI
11.04.2013	56394.482	16.10	18.28	–	Sch	FLI
04.08.2013	56509.288	16.02	17.97	–	Sch	FLI
05.08.2013	56510.386	16.11	18.20	19.32	Sch	FLI
06.08.2013	56511.411	16.09	18.34	19.09	Sch	FLI
07.08.2013	56512.398	16.02	18.10	19.10	Sch	FLI
04.09.2013	56540.274	15.88	17.61	18.55	Sch	FLI
28.12.2013	56655.200	16.01	18.04	–	Sch	FLI
29.12.2013	56656.180	15.89	17.81	18.73	Sch	FLI
23.01.2014	56681.189	15.98	17.74	18.68	Sch	FLI
22.03.2014	56738.590	15.92	17.73	18.75	Sch	FLI
21.05.2014	56799.425	15.93	17.79	–	Sch	FLI
28.06.2014	56837.417	15.99	17.94	–	Sch	FLI
29.06.2014	56838.398	15.89	17.84	19.18	Sch	FLI
24.07.2014	56863.339	15.93	17.86	18.90	Sch	FLI
25.07.2014	56864.356	16.01	–	–	Sch	FLI
03.08.2014	56873.386	15.87	17.77	18.70	Sch	FLI
04.08.2014	56874.407	15.87	17.80	18.92	Sch	FLI
18.08.2014	56888.450	15.95	17.68	18.76	Sch	FLI
19.08.2014	56889.365	15.83	17.54	18.61	Sch	FLI
13.12.2014	57005.181	16.05	17.87	18.79	Sch	FLI
14.12.2014	57006.220	15.87	17.76	18.57	Sch	FLI

Table A2. Photometric CCD observations and data of FHO 27 during the period 2000 October–2014 December.

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
29.10.2000	51847.241	14.70	16.05	17.21	18.55	Sch	ST-8
30.10.2000	51848.300	14.63	15.99	17.16	18.60	Sch	ST-8
24.12.2000	51903.243	14.54	15.88	17.02	–	Sch	ST-8
27.05.2001	52057.425	14.64	16.00	17.24	–	Sch	ST-8
03.10.2002	52551.364	14.79	16.13	17.43	19.19	Sch	ST-8
04.10.2002	52552.394	14.78	16.16	17.44	18.64	Sch	ST-8
29.10.2002	52577.288	14.36	15.58	16.68	17.84	Sch	ST-8
30.10.2002	52578.284	14.42	15.73	16.84	18.29	Sch	ST-8
01.11.2002	52580.193	14.69	16.07	17.26	19.23	Sch	ST-8
28.11.2002	52607.212	14.70	16.03	17.18	18.53	Sch	ST-8
06.03.2003	52765.517	15.08	16.55	17.78	19.42	Sch	ST-8
27.09.2003	52910.375	14.97	16.37	17.69	19.10	Sch	ST-8
25.11.2003	52969.192	14.89	16.30	17.55	18.86	Sch	ST-8
17.07.2004	53203.607	14.79	16.14	17.30	–	Sch	ST-8
18.11.2004	53328.231	14.54	15.84	17.02	18.40	Sch	ST-8
20.11.2004	53330.273	14.68	16.04	17.15	18.91	Sch	ST-8
19.07.2006	53936.474	14.96	16.39	17.73	–	Sch	ST-8
16.12.2006	54086.204	14.95	16.17	–	–	Sch	ST-8
23.07.2007	54305.319	14.74	16.01	17.25	18.80	1.3-m	ANDOR
24.07.2007	54306.315	14.58	15.82	17.02	18.48	1.3-m	ANDOR
28.08.2008	54707.312	14.69	15.81	16.94	18.46	Sch	STL-11
23.10.2008	54763.202	14.56	15.82	17.05	–	Sch	STL-11
16.04.2009	54938.551	14.92	16.22	17.42	19.19	Sch	STL-11
26.06.2009	55009.521	14.82	16.12	17.37	18.95	1.3-m	ANDOR
28.06.2009	55011.458	15.16	16.56	17.92	–	Sch	FLI
04.07.2009	55016.500	14.85	16.16	17.40	18.98	1.3-m	ANDOR
09.07.2009	55022.502	14.83	16.17	17.54	19.62	1.3-m	ANDOR
14.07.2009	55027.412	14.85	16.16	17.37	–	Sch	FLI
15.07.2009	55028.380	14.80	16.22	17.45	–	Sch	FLI
21.08.2009	55065.292	15.27	16.74	18.22	–	Sch	FLI
06.10.2009	55111.330	–	17.66	19.12	–	Sch	FLI
08.10.2009	55113.243	15.13	16.52	17.85	19.30	Sch	FLI
20.11.2009	55156.197	15.74	17.13	18.51	–	Sch	FLI
21.11.2009	55157.227	15.66	16.99	18.35	–	Sch	FLI
13.05.2010	55330.436	14.72	16.06	17.35	19.13	Sch	FLI
10.06.2010	55358.424	14.80	16.15	17.48	–	Sch	FLI
06.08.2010	55415.466	14.62	15.91	17.16	18.64	Sch	FLI
07.08.2010	55416.433	14.63	15.95	17.24	18.84	Sch	FLI
07.09.2010	55447.420	14.73	16.03	17.31	18.96	Sch	FLI
08.09.2010	55448.326	14.65	15.99	17.23	18.88	Sch	FLI
09.09.2010	55449.407	14.60	15.87	17.11	18.61	Sch	FLI
31.10.2010	55501.195	14.51	15.84	17.06	18.54	Sch	FLI
02.11.2010	55503.223	14.42	15.67	16.82	18.27	Sch	FLI
03.11.2010	55504.195	14.50	15.79	16.96	18.59	Sch	FLI
04.11.2010	55505.202	14.44	15.70	16.87	18.34	Sch	FLI
05.11.2010	55506.226	14.59	15.89	17.11	18.61	Sch	FLI
06.11.2010	55507.224	14.58	15.89	17.11	18.72	Sch	FLI
01.01.2011	55563.169	14.85	16.18	17.45	18.89	Sch	FLI
07.02.2011	55600.202	14.89	16.19	17.51	–	Sch	FLI
08.02.2011	55600.671	14.82	16.18	17.50	–	Sch	FLI
04.04.2011	55656.509	14.56	15.83	17.05	18.42	Sch	FLI
21.05.2011	55703.384	14.72	16.01	17.20	18.78	Sch	FLI
22.05.2011	55704.430	14.71	16.04	17.27	–	Sch	FLI
23.05.2011	55705.408	14.77	16.10	17.24	19.08	Sch	FLI
24.05.2011	55706.382	14.78	16.13	17.31	–	Sch	FLI
25.05.2011	55707.390	14.77	16.02	17.26	–	Sch	FLI
09.06.2011	55722.425	14.60	15.88	17.19	18.48	Sch	FLI
21.06.2011	55734.420	14.71	15.98	17.24	18.52	Sch	FLI
22.06.2011	55735.452	14.91	16.31	17.62	19.44	Sch	FLI
23.06.2011	55736.443	14.92	16.32	17.66	–	Sch	FLI
24.06.2011	55737.443	14.80	16.15	17.39	19.14	Sch	FLI

Table A2. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
27.07.2011	55770.361	14.73	16.07	17.32	18.92	Sch	FLI
23.08.2011	55797.323	14.78	16.19	17.45	–	Sch	FLI
24.08.2011	55798.301	14.63	15.95	17.23	18.76	Sch	FLI
25.08.2011	55799.318	14.43	15.73	16.88	18.43	Sch	FLI
23.09.2011	55828.249	14.78	16.14	17.49	19.16	Sch	FLI
27.11.2011	55893.176	16.31	17.62	–	–	Sch	FLI
28.11.2011	55894.175	16.05	17.52	18.78	–	Sch	FLI
29.11.2011	55895.167	16.00	17.40	18.85	–	Sch	FLI
30.11.2011	55896.179	16.19	17.65	19.07	–	Sch	FLI
29.12.2011	55925.169	15.19	16.66	17.99	–	Sch	FLI
01.01.2012	55928.185	15.28	16.72	18.12	–	Sch	FLI
16.03.2012	56003.563	14.52	15.76	16.97	18.37	Sch	FLI
13.04.2012	56030.508	15.60	17.09	18.80	–	Sch	FLI
12.05.2012	56060.415	15.43	16.80	18.01	–	Sch	FLI
20.05.2012	56068.399	15.37	16.71	–	–	Sch	FLI
12.06.2012	56091.398	15.94	17.43	18.85	–	Sch	FLI
13.06.2012	56092.383	15.70	17.17	18.55	–	Sch	FLI
17.06.2012	56096.398	15.69	17.20	–	–	Sch	FLI
11.07.2012	56120.377	15.70	17.22	18.59	–	Sch	FLI
12.07.2012	56121.338	15.31	16.69	17.98	–	Sch	FLI
13.07.2012	56122.399	15.49	16.92	18.20	–	Sch	FLI
14.07.2012	56123.387	15.34	16.79	18.06	–	Sch	FLI
19.08.2012	56159.351	15.69	17.21	18.61	–	Sch	FLI
20.08.2012	56160.329	15.74	17.28	18.66	–	Sch	FLI
21.08.2012	56161.346	15.65	17.12	18.44	–	Sch	FLI
22.08.2012	56162.338	15.58	17.16	18.60	–	Sch	FLI
04.09.2012	56175.426	15.64	17.15	18.37	–	Sch	FLI
05.09.2012	56176.272	15.68	17.18	18.51	–	Sch	FLI
08.09.2012	56179.272	15.57	17.09	–	–	60-cm	FLI
09.09.2012	56180.364	15.51	16.99	18.06	–	60-cm	FLI
22.09.2012	56193.339	15.59	17.05	18.32	–	Sch	FLI
23.09.2012	56194.322	15.74	17.31	18.61	19.45	Sch	FLI
07.10.2012	56208.210	15.79	17.31	18.66	–	Sch	FLI
08.10.2012	56209.204	15.52	17.00	18.39	–	Sch	FLI
09.10.2012	56210.193	15.59	17.13	18.54	–	Sch	FLI
10.10.2012	56211.461	15.73	17.14	–	–	Sch	FLI
25.10.2012	56226.240	15.65	17.18	18.60	–	Sch	FLI
26.10.2012	56227.401	15.76	17.20	18.71	–	Sch	FLI
30.10.2012	56231.322	16.21	17.50	–	–	60-cm	FLI
17.11.2012	56249.172	16.12	17.81	19.26	–	Sch	FLI
18.11.2012	56250.181	16.25	17.93	–	–	Sch	FLI
31.12.2012	56293.254	15.53	17.05	18.31	–	Sch	FLI
01.01.2013	56294.228	15.52	16.97	18.27	–	60-cm	FLI
03.01.2013	56296.273	15.58	17.01	–	–	60-cm	FLI
16.01.2013	56309.243	15.66	17.20	–	–	Sch	FLI
04.02.2013	56328.205	15.55	–	–	–	Sch	FLI
05.02.2013	56329.196	15.51	16.99	18.23	–	Sch	FLI
06.03.2013	56357.595	15.31	16.65	17.68	–	60-cm	FLI
10.04.2013	56392.510	15.17	16.49	–	–	Sch	FLI
11.04.2013	56394.482	14.96	16.32	17.56	19.04	Sch	FLI
02.05.2013	56415.418	15.45	16.87	18.12	19.38	Sch	FLI
15.05.2013	56428.404	15.34	16.60	–	–	60-cm	FLI
17.05.2013	56430.408	15.33	16.48	–	–	60-cm	FLI
19.05.2013	56432.405	15.29	16.50	17.83	–	60-cm	FLI
30.05.2013	56443.367	15.19	16.42	–	–	Sch	FLI
31.05.2013	56444.354	15.35	16.68	18.08	–	Sch	FLI
04.08.2013	56509.288	15.31	16.77	18.07	–	Sch	FLI
05.08.2013	56510.369	15.51	16.87	18.38	–	60-cm	FLI
05.08.2013	56510.386	15.35	16.78	18.11	–	Sch	FLI
06.08.2013	56511.411	15.36	–	18.15	–	Sch	FLI
06.08.2013	56511.413	15.46	16.75	18.36	–	60-cm	FLI
07.08.2013	56512.398	15.36	16.82	18.17	–	Sch	FLI

Table A2. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
07.08.2013	56512.403	15.54	16.80	18.31	–	60-cm	FLI
08.08.2013	56513.382	15.31	16.59	18.08	–	60-cm	FLI
09.08.2013	56514.350	15.33	16.60	17.87	–	60-cm	FLI
12.08.2013	56517.284	15.14	16.33	17.76	–	60-cm	FLI
04.09.2013	56540.274	15.27	16.64	17.93	–	Sch	FLI
05.09.2013	56541.322	15.20	16.64	17.90	–	Sch	FLI
06.09.2013	56542.381	15.10	16.53	17.72	19.16	Sch	FLI
11.09.2013	56547.383	15.06	16.22	–	–	60-cm	FLI
14.09.2013	56550.363	15.07	16.22	17.44	18.60	60-cm	FLI
11.10.2013	56577.306	15.27	–	17.93	–	60-cm	FLI
12.10.2013	56578.331	15.26	16.56	17.85	19.05	60-cm	FLI
07.11.2013	56604.264	15.12	16.35	17.61	–	60-cm	FLI
28.12.2013	56655.200	15.22	16.51	17.91	19.46	Sch	FLI
29.12.2013	56656.180	15.13	16.46	17.85	19.37	Sch	FLI
30.12.2013	56657.193	15.03	16.36	17.71	19.24	Sch	FLI
23.01.2014	56681.189	14.99	16.34	17.67	–	Sch	FLI
22.03.2014	56738.590	15.08	16.46	17.80	19.37	Sch	FLI
21.05.2014	56799.425	14.84	16.18	17.41	–	Sch	FLI
28.06.2014	56837.417	14.96	16.29	17.45	18.99	Sch	FLI
29.06.2014	56838.398	14.95	16.28	17.45	18.96	Sch	FLI
20.07.2014	56859.390	15.01	16.23	17.15	–	60-cm	FLI
21.07.2014	56860.391	15.06	16.35	17.28	–	60-cm	FLI
24.07.2014	56863.339	14.92	16.30	17.57	–	Sch	FLI
25.07.2014	56864.356	14.99	16.26	–	–	Sch	FLI
03.08.2014	56873.386	15.02	16.43	17.73	19.40	Sch	FLI
04.08.2014	56874.407	14.90	16.34	17.57	–	Sch	FLI
18.08.2014	56888.450	14.92	16.28	17.53	19.09	Sch	FLI
19.08.2014	56889.365	15.03	16.31	17.52	19.04	Sch	FLI
26.11.2014	56988.181	15.21	16.63	17.90	–	Sch	FLI
13.12.2014	57005.181	15.72	17.17	18.62	–	Sch	FLI
14.12.2014	57006.220	15.61	17.02	18.41	–	Sch	FLI

Table A3. Photometric CCD observations and data of FHO 28 during the period 1997 June–2014 December.

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
01.06.1997	50601.491	15.81	17.34	18.96	–	2-m	Phot
14.06.2000	51710.467	15.51	–	18.77	–	1.3-m	Phot
16.06.2000	51711.507	15.52	–	18.78	–	1.3-m	Phot
17.06.2000	51712.510	15.54	–	18.80	–	1.3-m	Phot
20.06.2000	51716.377	16.65	–	20.23	–	1.3-m	Phot
22.06.2000	51717.538	15.83	17.59	19.07	–	1.3-m	Phot
23.06.2000	51718.545	15.58	–	18.79	–	1.3-m	Phot
23.06.2000	51719.470	15.51	17.26	18.75	–	1.3-m	Phot
25.06.2000	51720.515	15.52	17.28	18.74	–	1.3-m	Phot
07.08.2000	51764.385	15.59	17.34	18.79	20.47	1.3-m	Phot
29.10.2000	51847.241	15.65	17.52	19.25	–	Sch	ST-8
30.10.2000	51848.300	15.58	17.43	18.88	–	Sch	ST-8
24.12.2000	51903.243	16.06	18.39	–	–	Sch	ST-8
27.05.2001	52057.425	15.81	17.87	–	–	Sch	ST-8
16.06.2001	52106.549	15.62	–	18.90	–	1.3-m	Phot
06.08.2001	52128.486	15.60	17.36	18.83	–	1.3-m	Phot
02.09.2001	52154.515	15.85	–	19.21	–	1.3-m	Phot
07.06.2002	52433.445	15.56	17.38	18.99	–	1.3-m	Phot
23.06.2002	52449.000	15.66	–	19.05	–	1.3-m	Phot
01.07.2002	52456.632	–	17.95	–	–	1.3-m	Phot
15.07.2002	52471.468	15.49	–	18.72	–	1.3-m	Phot
03.10.2002	52551.364	16.09	18.11	–	–	Sch	ST-8

Table A3. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
04.10.2002	52552.394	16.28	18.48	–	–	Sch	ST-8
29.10.2002	52577.288	15.79	17.98	–	–	Sch	ST-8
30.10.2002	52578.284	15.63	17.77	19.43	–	Sch	ST-8
01.11.2002	52580.193	15.67	17.71	19.01	–	Sch	ST-8
28.11.2002	52607.212	15.60	17.46	18.73	–	Sch	ST-8
03.03.2003	52701.593	15.68	17.17	18.77	20.19	2-m	Phot
06.05.2003	52765.517	15.99	17.91	19.40	–	Sch	ST-8
27.09.2003	52910.375	15.67	17.44	18.70	–	Sch	ST-8
25.11.2003	52969.192	15.66	17.72	18.82	–	Sch	ST-8
22.03.2004	53086.582	15.66	17.32	18.73	–	2-m	Phot
17.07.2004	53203.607	15.63	17.66	–	–	Sch	ST-8
20.08.2004	53238.328	15.53	17.33	18.85	–	1.3-m	Phot
08.09.2004	53257.324	15.49	17.29	18.75	–	1.3-m	Phot
09.09.2004	53258.408	15.54	17.34	18.85	–	1.3-m	Phot
28.09.2004	53277.227	15.95	17.88	19.25	–	1.3-m	Phot
29.09.2004	53278.237	15.58	17.35	18.91	20.33	1.3-m	Phot
30.09.2004	53279.274	15.90	17.76	19.31	–	1.3-m	Phot
18.11.2004	53328.231	16.08	18.24	–	–	Sch	ST-8
20.11.2004	53330.273	15.69	17.68	18.84	–	Sch	ST-8
23.08.2005	53606.289	15.63	17.44	18.91	–	1.3-m	Phot
27.08.2005	53609.509	15.71	17.58	19.07	–	1.3-m	Phot
27.08.2005	53610.438	15.61	17.44	19.04	–	1.3-m	Phot
14.09.2005	53628.281	15.63	17.44	18.95	–	1.3-m	Phot
27.03.2006	53821.545	15.85	17.58	19.42	–	2-m	VA
19.07.2006	53936.474	15.95	18.31	–	–	Sch	ST-8
21.07.2006	53938.394	15.62	17.08	18.58	20.02	2-m	Phot
30.09.2006	54009.385	15.64	17.47	18.89	–	1.3-m	Phot
05.10.2006	54014.359	16.18	18.10	19.79	–	1.3-m	Phot
16.12.2006	54086.204	16.79	18.84	–	–	Sch	ST-8
26.06.2007	54278.380	15.53	17.27	18.87	–	1.3-m	Phot
03.07.2007	54285.341	15.60	17.43	18.93	–	1.3-m	Phot
23.07.2007	54305.319	16.01	17.97	19.64	–	1.3-m	ANDOR
24.07.2007	54306.317	15.77	17.63	19.26	–	1.3-m	ANDOR
16.08.2007	54329.384	15.43	17.00	18.65	–	2-m	VA
17.08.2007	54330.289	15.44	17.02	18.68	–	2-m	VA
28.06.2008	54646.366	15.75	17.71	19.35	–	1.3-m	ANDOR
29.06.2008	54647.384	15.84	17.77	19.35	–	1.3-m	ANDOR
05.07.2008	54653.347	15.67	17.45	18.93	–	1.3-m	ANDOR
06.07.2008	54654.376	15.84	17.80	19.35	–	1.3-m	ANDOR
25.07.2008	54673.331	16.06	18.03	19.70	–	1.3-m	ANDOR
28.08.2008	54707.312	16.05	17.75	19.31	–	Sch	STL-11
23.10.2008	54763.202	15.80	17.41	–	–	Sch	STL-11
16.04.2009	54938.551	15.81	17.72	–	–	Sch	STL-11
17.06.2009	55000.499	16.03	17.99	19.65	–	1.3-m	ANDOR
27.06.2009	55009.522	15.69	17.56	19.05	–	1.3-m	ANDOR
28.06.2009	55011.458	16.56	18.89	–	–	Sch	FLI
04.07.2009	55016.501	15.95	17.75	19.31	–	1.3-m	ANDOR
10.07.2009	55022.502	16.10	18.22	20.10	–	1.3-m	ANDOR
14.07.2009	55027.412	16.13	18.32	19.30	–	Sch	FLI
15.07.2009	55028.380	16.14	18.34	–	–	Sch	FLI
31.07.2009	55044.338	15.89	17.79	19.30	–	1.3-m	ANDOR
21.08.2009	55065.292	16.19	18.20	–	–	Sch	FLI
06.10.2009	55111.330	16.02	–	–	–	Sch	FLI
08.10.2009	55113.243	15.82	17.64	18.79	–	Sch	FLI
20.11.2009	55156.197	16.13	18.24	–	–	Sch	FLI
21.11.2009	55157.227	15.73	17.65	19.13	–	Sch	FLI
13.05.2010	55330.436	15.83	17.78	–	–	Sch	FLI
10.06.2010	55358.424	15.79	17.67	19.01	–	Sch	FLI
06.08.2010	55415.466	15.74	17.62	18.96	–	Sch	FLI
07.08.2010	55416.433	15.64	17.52	19.08	–	Sch	FLI
11.08.2010	55420.497	15.69	17.66	19.20	–	1.3-m	ANDOR
12.08.2010	55421.326	16.34	18.39	20.15	–	1.3-m	ANDOR

Table A3. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
13.08.2010	55422.258	15.85	17.76	19.32	–	1.3-m	ANDOR
14.08.2010	55423.256	15.80	17.73	19.20	–	1.3-m	ANDOR
16.08.2010	55425.250	15.62	17.38	18.91	20.39	1.3-m	ANDOR
18.08.2010	55426.599	15.59	17.38	18.90	–	1.3-m	ANDOR
19.08.2010	55427.591	15.60	17.41	18.99	–	1.3-m	ANDOR
20.08.2010	55428.590	15.68	17.53	19.17	–	1.3-m	ANDOR
21.08.2010	55429.589	15.79	17.71	19.28	–	1.3-m	ANDOR
24.08.2010	55432.519	15.63	17.54	19.05	–	1.3-m	ANDOR
24.08.2010	55433.470	15.67	17.49	19.11	–	1.3-m	ANDOR
25.08.2010	55434.290	15.57	17.36	18.80	20.33	1.3-m	ANDOR
26.08.2010	55435.310	15.57	17.39	18.82	20.24	1.3-m	ANDOR
30.08.2010	55439.237	15.65	17.58	19.16	–	1.3-m	ANDOR
31.08.2010	55440.238	15.68	17.45	18.93	–	1.3-m	ANDOR
07.09.2010	55447.420	16.16	18.00	19.28	–	Sch	FLI
08.09.2010	55448.326	15.75	17.61	18.93	–	Sch	FLI
09.09.2010	55449.407	15.69	17.51	19.23	–	Sch	FLI
18.09.2010	55458.218	15.82	17.70	19.29	20.47	1.3-m	ANDOR
20.09.2010	55459.513	15.78	17.67	19.18	–	1.3-m	ANDOR
11.10.2010	55481.276	15.72	17.62	19.12	–	1.3-m	ANDOR
29.10.2010	55499.257	15.71	17.21	18.88	–	2-m	VA
30.10.2010	55500.215	15.64	17.19	18.88	–	2-m	VA
31.10.2010	55501.195	15.67	17.50	18.89	–	Sch	FLI
31.10.2010	55501.287	15.60	17.15	18.78	–	2-m	VA
01.11.2010	55502.234	16.12	17.84	19.66	–	2-m	VA
02.11.2010	55503.223	16.99	–	–	–	Sch	FLI
03.11.2010	55504.195	16.04	18.04	19.50	–	Sch	FLI
04.11.2010	55505.202	16.03	18.06	19.29	–	Sch	FLI
05.11.2010	55506.226	15.72	17.60	19.26	–	Sch	FLI
06.11.2010	55507.224	15.72	17.63	19.38	–	Sch	FLI
01.01.2011	55563.169	15.83	17.86	19.18	–	Sch	FLI
06.01.2011	55568.198	15.70	17.15	18.73	20.44	2-m	VA
07.01.2011	55569.210	15.56	17.06	18.59	–	2-m	VA
08.01.2011	55570.204	15.48	17.00	18.62	20.47	2-m	VA
09.01.2011	55571.216	15.70	17.30	19.03	–	2-m	VA
10.01.2011	55572.175	–	17.22	–	–	2-m	VA
11.01.2011	55573.232	16.32	18.02	19.87	–	2-m	VA
12.01.2011	55574.219	15.84	17.27	18.85	–	2-m	VA
07.02.2011	55600.202	16.60	–	–	–	Sch	FLI
08.02.2011	55600.671	16.42	18.70	–	–	Sch	FLI
04.04.2011	55656.509	15.83	17.88	–	–	Sch	FLI
08.04.2011	55659.519	15.71	17.34	18.95	–	2-m	VA
02.05.2011	55683.573	15.67	17.21	18.91	–	2-m	VA
21.05.2011	55703.384	15.94	17.86	–	–	Sch	FLI
22.05.2011	55704.430	15.79	17.70	–	–	Sch	FLI
23.05.2011	55705.408	15.70	17.70	19.48	–	Sch	FLI
24.05.2011	55706.382	16.36	–	–	–	Sch	FLI
25.05.2011	55707.390	16.09	17.57	–	–	Sch	FLI
08.06.2011	55721.380	15.96	17.41	19.17	–	2-m	VA
09.06.2011	55722.425	15.73	17.59	–	–	Sch	FLI
21.06.2011	55734.420	15.68	17.72	–	–	Sch	FLI
22.06.2011	55735.452	15.72	17.57	19.16	–	Sch	FLI
23.06.2011	55736.443	15.63	17.64	–	–	Sch	FLI
24.06.2011	55737.443	15.78	17.81	–	–	Sch	FLI
27.07.2011	55770.361	15.63	17.51	19.15	–	Sch	FLI
16.08.2011	55790.386	15.71	17.60	19.15	–	1.3-m	ANDOR
17.08.2011	55791.414	15.58	17.47	18.89	–	1.3-m	ANDOR
18.08.2011	55792.397	15.92	17.82	19.38	–	1.3-m	ANDOR
23.08.2011	55797.323	15.72	17.72	19.18	–	Sch	FLI
24.08.2011	55798.301	15.76	17.77	19.27	–	Sch	FLI
25.08.2011	55799.318	15.74	17.66	19.19	–	Sch	FLI
10.09.2011	55815.249	15.61	17.55	19.10	–	1.3-m	ANDOR
11.09.2011	55816.379	15.70	17.57	19.15	–	1.3-m	ANDOR

Table A3. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
19.09.2011	55824.281	15.61	17.59	19.07	–	1.3-m	ANDOR
23.09.2011	55828.249	15.72	17.63	18.96	–	Sch	FLI
07.10.2011	55842.269	15.59	17.54	19.11	–	1.3-m	ANDOR
13.10.2011	55848.277	15.65	17.55	19.11	–	1.3-m	ANDOR
29.10.2011	55864.251	15.64	17.16	18.82	–	2-m	VA
30.10.2011	55865.186	15.66	17.16	18.93	–	2-m	VA
31.10.2011	55866.282	15.69	17.29	19.06	–	2-m	VA
26.11.2011	55892.170	15.63	17.12	18.78	–	2-m	VA
27.11.2011	55893.176	15.98	18.16	–	–	Sch	FLI
28.11.2011	55894.175	15.83	17.65	19.27	–	Sch	FLI
29.11.2011	55895.167	15.87	17.83	19.46	–	Sch	FLI
30.11.2011	55896.179	15.68	17.52	18.80	–	Sch	FLI
29.12.2011	55925.169	15.80	17.50	19.01	–	Sch	FLI
01.01.2012	55928.185	15.78	17.65	19.23	–	Sch	FLI
31.01.2012	55958.188	15.97	17.47	–	–	2-m	VA
16.03.2012	56003.563	15.94	17.80	–	–	Sch	FLI
29.03.2012	56015.506	15.92	17.03	18.62	20.39	2-m	VA
13.04.2012	56030.508	15.80	17.62	–	–	Sch	FLI
12.05.2012	56060.415	16.22	18.11	–	–	Sch	FLI
20.05.2012	56068.399	17.07	–	–	–	Sch	FLI
12.06.2012	56091.398	16.24	18.15	19.37	–	Sch	FLI
13.06.2012	56092.383	16.76	18.95	–	–	Sch	FLI
15.06.2012	56094.441	16.43	18.07	19.80	–	2-m	VA
17.06.2012	56096.398	16.23	18.22	–	–	Sch	FLI
11.07.2012	56120.377	16.82	19.38	–	–	Sch	FLI
12.07.2012	56121.338	16.26	18.24	–	–	Sch	FLI
13.07.2012	56122.399	15.81	17.59	19.06	–	Sch	FLI
14.07.2012	56123.387	15.71	17.44	18.80	–	Sch	FLI
30.07.2012	56139.279	16.45	18.23	19.45	–	1.3-m	ANDOR
01.08.2012	56141.416	16.01	17.71	19.23	–	1.3-m	ANDOR
02.08.2012	56142.270	16.25	18.08	19.60	–	1.3-m	ANDOR
03.08.2012	56143.254	16.01	17.97	19.38	–	1.3-m	ANDOR
04.08.2012	56144.251	15.81	17.55	19.30	–	1.3-m	ANDOR
11.08.2012	56150.615	15.84	17.67	19.14	–	1.3-m	ANDOR
12.08.2012	56151.621	16.00	–	–	–	1.3-m	ANDOR
13.08.2012	56152.624	16.12	18.00	–	–	1.3-m	ANDOR
14.08.2012	56153.624	15.83	17.65	–	–	1.3-m	ANDOR
15.08.2012	56154.622	15.91	17.93	19.93	–	1.3-m	ANDOR
16.08.2012	56155.620	16.07	18.05	–	–	1.3-m	ANDOR
16.08.2012	56156.242	15.85	–	–	–	1.3-m	ANDOR
18.08.2012	56157.582	16.40	18.29	19.92	–	1.3-m	ANDOR
19.08.2012	56159.351	15.75	17.54	18.75	–	Sch	FLI
20.08.2012	56160.329	16.53	18.62	–	–	Sch	FLI
21.08.2012	56160.529	16.36	18.35	19.97	–	1.3-m	ANDOR
21.08.2012	56161.346	15.82	17.50	18.71	–	Sch	FLI
22.08.2012	56162.338	15.69	17.59	18.87	–	Sch	FLI
02.09.2012	56173.335	16.37	18.37	19.88	–	1.3-m	ANDOR
03.09.2012	56174.306	16.01	17.98	19.57	–	1.3-m	ANDOR
04.09.2012	56175.426	15.88	17.71	19.23	–	Sch	FLI
05.09.2012	56176.272	15.76	17.73	19.00	–	Sch	FLI
07.09.2012	56178.259	15.69	17.49	18.96	–	1.3-m	ANDOR
08.09.2012	56179.272	15.74	17.55	18.94	–	60-cm	FLI
08.09.2012	56179.467	15.66	17.52	19.00	–	1.3-m	ANDOR
09.09.2012	56180.312	15.66	17.46	18.97	–	1.3-m	ANDOR
09.09.2012	56180.364	15.74	17.69	–	–	60-cm	FLI
10.09.2012	56181.288	15.62	17.46	18.97	20.45	1.3-m	ANDOR
11.09.2012	56182.246	15.81	17.72	19.22	–	1.3-m	ANDOR
12.09.2012	56183.370	16.11	18.13	19.81	–	1.3-m	ANDOR
22.09.2012	56193.282	15.92	17.74	19.19	–	1.3-m	ANDOR
22.09.2012	56193.339	15.98	17.79	19.17	–	Sch	FLI
23.09.2012	56194.322	15.70	17.61	19.24	–	Sch	FLI
07.10.2012	56208.210	16.22	18.06	–	–	Sch	FLI

Table A3. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
08.10.2012	56209.204	15.65	17.42	19.02	–	Sch	FLI
09.10.2012	56210.193	15.63	17.49	18.97	–	Sch	FLI
10.10.2012	56211.461	15.56	17.38	–	–	Sch	FLI
13.10.2012	56214.193	15.70	17.19	18.89	20.48	2-m	VA
25.10.2012	56226.240	15.69	17.59	19.01	–	Sch	FLI
26.10.2012	56227.401	15.70	17.61	18.97	–	Sch	FLI
30.10.2012	56231.322	15.66	17.45	–	–	60-cm	FLI
17.11.2012	56249.172	15.82	17.65	19.32	–	Sch	FLI
18.11.2012	56250.181	15.78	17.51	19.11	–	Sch	FLI
12.12.2012	56274.163	15.49	16.94	18.60	–	2-m	VA
13.12.2012	56275.215	15.76	17.24	18.92	–	2-m	VA
14.12.2012	56276.165	15.94	17.47	19.26	–	2-m	VA
15.12.2012	56277.161	15.54	17.35	18.78	–	2-m	VA
31.12.2012	56293.254	15.72	17.60	19.41	–	Sch	FLI
01.01.2013	56294.228	15.70	17.52	–	–	60-cm	FLI
03.01.2013	56296.273	15.55	17.40	–	–	60-cm	FLI
16.01.2013	56309.243	16.21	17.93	19.05	–	Sch	FLI
19.01.2013	56312.225	15.62	16.98	18.55	–	2-m	VA
04.02.2013	56328.205	15.86	17.16	–	–	Sch	FLI
05.02.2013	56329.196	16.00	17.44	–	–	Sch	FLI
06.03.2013	56357.595	15.87	17.77	–	–	60-cm	FLI
18.03.2013	56369.610	16.19	17.76	19.36	–	2-m	VA
10.04.2013	56392.510	15.92	17.99	–	–	Sch	FLI
11.04.2013	56394.482	16.85	17.32	–	–	Sch	FLI
02.05.2013	56415.418	15.60	16.89	18.77	–	Sch	FLI
04.05.2013	56417.466	15.72	17.36	19.07	–	2-m	VA
15.05.2013	56428.404	16.07	18.82	–	–	60-cm	FLI
17.05.2013	56430.408	15.65	17.40	–	–	60-cm	FLI
19.05.2013	56432.405	15.42	17.24	–	–	60-cm	FLI
30.05.2013	56443.367	15.66	17.22	–	–	Sch	FLI
31.05.2013	56444.354	16.04	17.83	–	–	Sch	FLI
04.07.2013	56478.363	15.66	17.14	18.76	20.49	2-m	VA
01.08.2013	56506.281	15.86	17.43	19.23	–	2-m	VA
02.08.2013	56507.272	15.73	17.21	18.93	–	2-m	VA
03.08.2013	56508.318	15.85	17.42	19.15	–	2-m	VA
04.08.2013	56509.288	15.84	17.67	19.33	–	Sch	FLI
05.08.2013	56510.369	15.53	17.26	18.78	–	60-cm	FLI
05.08.2013	56510.386	15.56	17.38	18.84	–	Sch	FLI
06.08.2013	56511.411	15.58	17.34	18.72	–	Sch	FLI
06.08.2013	56511.413	15.51	17.25	18.75	–	60-cm	FLI
07.08.2013	56512.398	15.66	17.46	18.93	–	Sch	FLI
07.08.2013	56512.403	15.63	17.38	–	–	60-cm	FLI
08.08.2013	56513.382	15.52	17.17	18.77	–	60-cm	FLI
09.08.2013	56514.350	15.73	17.73	–	–	60-cm	FLI
12.08.2013	56517.284	15.55	17.48	18.70	–	60-cm	FLI
04.09.2013	56540.274	15.71	17.51	19.02	–	Sch	FLI
05.09.2013	56541.322	15.72	17.56	19.11	–	Sch	FLI
06.09.2013	56542.381	15.93	17.88	19.40	–	Sch	FLI
07.09.2013	56543.396	15.69	17.05	18.64	20.39	2-m	VA
08.09.2013	56544.264	15.70	17.19	18.82	20.47	2-m	VA
11.09.2013	56547.383	15.55	17.41	–	–	60-cm	FLI
14.09.2013	56550.363	15.69	17.57	–	–	60-cm	FLI
17.09.2013	56553.282	15.47	17.26	18.79	20.27	1.3-m	ANDOR
11.10.2013	56577.306	15.65	17.38	18.65	–	60-cm	FLI
12.10.2013	56578.331	15.49	17.20	–	–	60-cm	FLI
07.11.2013	56604.264	15.67	17.45	18.77	–	60-cm	FLI
09.12.2013	56636.185	15.98	17.55	19.26	–	2-m	VA
28.12.2013	56655.200	15.52	17.31	18.62	–	Sch	FLI
29.12.2013	56656.180	15.66	17.42	18.96	–	Sch	FLI
30.12.2013	56657.193	15.82	17.68	19.33	–	Sch	FLI
23.01.2014	56681.189	15.60	17.00	–	–	Sch	FLI
05.02.2014	56694.194	–	18.78	–	–	2-m	VA

Table A3. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
22.03.2014	56738.590	16.77	19.07	–	–	Sch	FLI
21.05.2014	56799.425	15.80	17.66	–	–	Sch	FLI
23.05.2014	56801.436	16.02	17.63	19.28	–	2-m	VA
23.06.2014	56832.391	15.99	17.70	19.52	–	2-m	VA
25.06.2014	56834.357	15.72	17.24	18.92	–	2-m	VA
26.06.2014	56835.462	15.70	17.22	18.86	–	2-m	VA
28.06.2014	56837.417	15.83	17.70	–	–	Sch	FLI
29.06.2014	56838.398	15.77	17.61	19.21	–	Sch	FLI
20.07.2014	56859.390	15.54	17.27	–	–	60-cm	FLI
21.07.2014	56860.391	15.68	17.77	–	–	60-cm	FLI
24.07.2014	56863.339	15.64	17.49	–	–	Sch	FLI
25.07.2014	56864.356	15.68	17.34	–	–	Sch	FLI
03.08.2014	56873.386	15.74	17.80	18.92	–	Sch	FLI
04.08.2014	56874.407	15.77	17.76	–	–	Sch	FLI
18.08.2014	56888.450	15.74	17.74	18.99	–	Sch	FLI
19.08.2014	56889.365	16.00	17.99	19.26	–	Sch	FLI
29.08.2014	56899.303	16.62	18.73	–	–	1.3-m	ANDOR
26.11.2014	56988.181	15.67	17.53	18.86	–	Sch	FLI
13.12.2014	57005.181	15.55	17.36	18.90	–	Sch	FLI
14.12.2014	57006.220	15.73	17.50	19.01	–	Sch	FLI
24.12.2014	57016.174	15.86	17.52	19.13	–	2-m	VA
25.12.2014	57017.175	15.88	17.55	19.30	–	2-m	VA

Table A4. Photometric CCD observations and data of FHO 29 during the period 2004 November–2014 December.

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
20.11.2004	53330.273	14.77	15.84	16.85	17.96	Sch	ST-8
16.12.2006	54086.204	15.83	16.83	–	19.00	Sch	ST-8
28.08.2008	54707.312	15.57	16.48	17.53	18.74	Sch	STL-11
16.04.2009	54938.551	16.19	17.21	–	–	Sch	STL-11
28.06.2009	55011.458	14.93	15.95	16.90	–	Sch	FLI
14.07.2009	55027.412	15.49	16.67	17.71	–	Sch	FLI
15.07.2009	55028.380	15.65	16.84	18.01	–	Sch	FLI
21.08.2009	55065.292	15.73	16.85	17.95	–	Sch	FLI
06.10.2009	55111.330	16.38	–	17.84	19.16	Sch	FLI
08.10.2009	55113.243	16.56	17.21	18.12	19.32	Sch	FLI
20.11.2009	55156.197	16.61	17.22	18.06	19.24	Sch	FLI
13.05.2010	55330.436	15.37	16.43	17.33	18.46	Sch	FLI
10.06.2010	55358.424	14.29	15.28	16.27	17.48	Sch	FLI
06.08.2010	55415.466	15.94	17.20	18.31	–	Sch	FLI
07.08.2010	55416.433	15.71	16.92	18.12	–	Sch	FLI
07.09.2010	55447.420	15.90	16.98	18.08	19.32	Sch	FLI
08.09.2010	55448.326	15.60	16.77	17.83	19.05	Sch	FLI
09.09.2010	55449.407	15.76	16.82	17.85	19.10	Sch	FLI
31.10.2010	55501.195	16.50	17.43	18.28	19.33	Sch	FLI
02.11.2010	55503.223	16.78	17.65	18.74	–	Sch	FLI
03.11.2010	55504.195	16.56	17.31	18.36	19.33	Sch	FLI
04.11.2010	55505.202	16.22	17.13	18.02	19.20	Sch	FLI
05.11.2010	55506.226	16.21	17.09	18.13	19.20	Sch	FLI
06.11.2010	55507.224	15.83	16.90	17.89	18.86	Sch	FLI
01.01.2011	55563.169	15.60	16.58	17.61	18.65	Sch	FLI
07.02.2011	55600.202	14.60	15.67	16.78	–	Sch	FLI
08.02.2011	55600.671	14.57	15.62	16.66	–	Sch	FLI
04.04.2011	55656.509	16.25	17.10	17.79	–	Sch	FLI
21.05.2011	55703.384	16.68	17.42	18.14	–	Sch	FLI
22.05.2011	55704.430	16.37	16.98	17.64	–	Sch	FLI
23.05.2011	55705.408	16.31	16.97	17.62	18.56	Sch	FLI
24.05.2011	55706.382	16.33	17.04	17.75	–	Sch	FLI

Table A4. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
25.05.2011	55707.390	16.47	17.29	17.89	–	Sch	FLI
09.06.2011	55722.425	16.74	17.43	18.14	19.23	Sch	FLI
21.06.2011	55734.420	16.15	16.96	17.88	19.07	Sch	FLI
22.06.2011	55735.452	16.11	17.00	17.85	18.98	Sch	FLI
23.06.2011	55736.443	16.29	17.32	18.09	–	Sch	FLI
24.06.2011	55737.443	16.16	17.08	17.90	18.92	Sch	FLI
27.07.2011	55770.361	15.61	16.64	17.54	18.58	Sch	FLI
23.08.2011	55797.323	15.79	16.84	17.88	18.90	Sch	FLI
24.08.2011	55798.301	15.78	16.80	17.78	18.79	Sch	FLI
25.08.2011	55799.318	15.75	16.76	17.72	18.93	Sch	FLI
23.09.2011	55828.249	15.74	16.83	17.90	19.23	Sch	FLI
27.11.2011	55893.176	14.74	15.68	16.54	17.74	Sch	FLI
28.11.2011	55894.175	15.00	16.03	16.99	18.14	Sch	FLI
29.11.2011	55895.167	15.05	16.12	17.11	18.31	Sch	FLI
30.11.2011	55896.179	14.84	15.75	16.67	17.74	Sch	FLI
29.12.2011	55925.169	15.38	16.41	17.25	18.28	Sch	FLI
01.01.2012	55928.185	16.14	16.95	17.82	18.85	Sch	FLI
16.03.2012	56003.563	14.65	15.75	16.84	18.27	Sch	FLI
13.04.2012	56030.508	15.58	16.67	17.61	19.23	Sch	FLI
12.05.2012	56060.415	15.27	16.48	17.59	–	Sch	FLI
20.05.2012	56068.399	14.34	15.45	16.37	–	Sch	FLI
12.06.2012	56091.398	15.10	16.24	17.29	18.43	Sch	FLI
13.06.2012	56092.383	15.12	16.23	17.27	18.39	Sch	FLI
17.06.2012	56096.398	14.48	15.56	16.62	17.92	Sch	FLI
11.07.2012	56120.377	15.02	16.17	17.17	18.59	Sch	FLI
12.07.2012	56121.338	14.46	15.58	16.59	17.94	Sch	FLI
13.07.2012	56122.399	14.81	15.92	17.01	18.33	Sch	FLI
14.07.2012	56123.387	15.45	16.51	17.62	18.93	Sch	FLI
19.08.2012	56159.351	15.63	16.72	17.76	18.79	Sch	FLI
20.08.2012	56160.329	15.52	16.56	17.50	18.67	Sch	FLI
21.08.2012	56161.346	15.86	16.70	17.71	18.83	Sch	FLI
22.08.2012	56162.338	16.08	16.78	17.66	18.64	Sch	FLI
04.09.2012	56175.426	15.24	16.35	17.27	18.00	Sch	FLI
05.09.2012	56176.272	15.41	16.42	17.36	18.45	Sch	FLI
08.09.2012	56179.272	16.95	17.72	18.53	–	60-cm	FLI
09.09.2012	56180.364	16.61	17.28	–	–	60-cm	FLI
22.09.2012	56193.339	16.65	17.65	18.57	–	Sch	FLI
23.09.2012	56194.322	16.63	17.42	18.13	19.43	Sch	FLI
07.10.2012	56208.210	16.39	17.00	17.78	18.80	Sch	FLI
08.10.2012	56209.204	16.69	17.51	18.37	19.23	Sch	FLI
09.10.2012	56210.193	16.85	17.59	18.43	19.43	Sch	FLI
10.10.2012	56211.461	16.78	17.73	–	–	Sch	FLI
25.10.2012	56226.240	16.63	17.38	18.14	18.99	Sch	FLI
26.10.2012	56227.401	17.15	17.67	18.61	–	Sch	FLI
30.10.2012	56231.322	16.85	–	–	–	60-cm	FLI
17.11.2012	56249.172	16.80	17.53	18.36	19.48	Sch	FLI
18.11.2012	56250.181	16.80	17.48	18.32	19.32	Sch	FLI
31.12.2012	56293.254	15.48	16.58	17.63	18.81	Sch	FLI
01.01.2013	56294.228	15.52	16.54	17.66	–	60-cm	FLI
03.01.2013	56296.273	16.07	16.96	–	–	60-cm	FLI
16.01.2013	56309.243	15.46	16.47	17.54	18.46	Sch	FLI
05.02.2013	56329.196	16.25	17.27	17.84	–	Sch	FLI
06.03.2013	56357.595	16.93	17.77	–	–	60-cm	FLI
11.04.2013	56394.482	17.13	17.91	18.50	–	Sch	FLI
02.05.2013	56415.418	17.47	18.12	19.01	–	Sch	FLI
15.05.2013	56428.404	16.18	17.25	–	–	60-cm	FLI
17.05.2013	56430.408	15.26	16.47	–	–	60-cm	FLI
19.05.2013	56432.405	15.89	17.16	17.78	–	60-cm	FLI
30.05.2013	56443.367	16.37	17.17	18.22	–	Sch	FLI
31.05.2013	56444.354	16.53	17.29	18.22	–	Sch	FLI
04.08.2013	56509.288	16.29	17.31	18.30	19.21	Sch	FLI
05.08.2013	56510.369	16.26	17.56	18.58	–	60-cm	FLI

Table A4. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
05.08.2013	56510.386	16.36	17.40	18.54	19.43	Sch	FLI
06.08.2013	56511.411	16.30	17.33	18.35	–	Sch	FLI
06.08.2013	56511.413	16.37	17.32	18.29	19.42	60-cm	FLI
07.08.2013	56512.398	15.83	17.01	17.90	19.10	Sch	FLI
07.08.2013	56512.403	15.89	17.01	17.93	–	60-cm	FLI
08.08.2013	56513.382	15.78	16.97	17.99	18.92	60-cm	FLI
09.08.2013	56514.350	16.76	17.83	–	–	60-cm	FLI
12.08.2013	56517.284	16.09	17.12	18.14	–	60-cm	FLI
04.09.2013	56540.274	15.34	16.50	17.49	18.75	Sch	FLI
05.09.2013	56541.322	15.13	16.24	17.29	18.45	Sch	FLI
06.09.2013	56542.381	14.95	16.11	17.16	18.39	Sch	FLI
11.09.2013	56547.383	15.60	16.76	17.74	–	60-cm	FLI
14.09.2013	56550.363	14.64	15.58	16.47	17.53	60-cm	FLI
11.10.2013	56577.306	15.51	16.58	17.58	–	60-cm	FLI
12.10.2013	56578.331	15.14	16.15	17.16	18.26	60-cm	FLI
07.11.2013	56604.264	–	17.74	18.91	–	60-cm	FLI
28.12.2013	56655.200	16.28	17.09	17.90	19.22	Sch	FLI
29.12.2013	56656.180	16.02	16.97	17.94	19.15	Sch	FLI
30.12.2013	56657.193	15.52	16.72	17.88	18.93	Sch	FLI
23.01.2014	56681.189	16.33	17.00	–	–	Sch	FLI
22.03.2014	56738.590	16.69	17.52	18.17	19.02	Sch	FLI
21.05.2014	56799.425	16.66	17.52	–	–	Sch	FLI
28.06.2014	56837.417	16.15	17.32	18.43	–	Sch	FLI
29.06.2014	56838.398	16.04	17.25	18.22	–	Sch	FLI
21.07.2014	56860.391	15.66	16.82	17.70	–	60-cm	FLI
24.07.2014	56863.339	15.51	16.66	–	19.03	Sch	FLI
25.07.2014	56864.356	15.65	16.67	–	–	Sch	FLI
03.08.2014	56873.386	15.89	16.64	17.44	18.39	Sch	FLI
04.08.2014	56874.407	16.01	16.74	17.54	18.75	Sch	FLI
18.08.2014	56888.450	15.62	16.71	17.73	19.26	Sch	FLI
19.08.2014	56889.365	15.62	16.80	17.87	19.41	Sch	FLI
26.11.2014	56988.181	15.55	16.55	17.54	18.71	Sch	FLI
13.12.2014	57005.181	15.04	16.19	17.03	18.34	Sch	FLI
14.12.2014	57006.220	15.24	16.38	17.26	–	Sch	FLI

Table A5. Photometric CCD observations and data of V1929 Cygni during the period 2010 October–2014 December.

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
29.10.2000	51847.241	13.85	14.47	15.16	16.16	Sch	ST-8
30.10.2000	51848.300	13.93	14.60	15.27	16.26	Sch	ST-8
24.12.2000	51903.243	13.87	14.49	15.19	–	Sch	ST-8
27.05.2001	52057.425	13.98	14.62	15.27	–	Sch	ST-8
03.10.2002	52551.364	13.83	14.42	15.06	16.01	Sch	ST-8
04.10.2002	52552.394	13.85	14.43	15.07	16.00	Sch	ST-8
29.10.2002	52577.288	13.93	14.60	15.25	16.26	Sch	ST-8
30.10.2002	52578.284	13.84	14.41	15.06	16.00	Sch	ST-8
01.11.2002	52580.193	13.85	14.48	15.14	16.12	Sch	ST-8
28.11.2008	52607.212	13.79	14.40	15.03	15.91	Sch	ST-8
27.09.2003	52910.375	13.85	14.50	15.18	16.16	Sch	ST-8
25.11.2003	52969.192	13.83	14.50	15.15	16.15	Sch	ST-8
17.07.2004	53203.607	13.88	14.51	15.18	–	Sch	ST-8
18.11.2004	53328.231	13.85	14.47	15.11	16.12	Sch	ST-8
20.11.2004	53330.273	13.78	14.38	15.03	16.00	Sch	ST-8
16.07.2006	53936.474	13.73	14.31	14.95	–	Sch	ST-8
28.08.2008	54707.312	13.64	14.22	14.84	15.77	Sch	STL-11
23.10.2008	54763.202	13.68	14.27	14.90	15.97	Sch	STL-11
16.04.2009	54938.551	13.65	14.20	–	–	Sch	STL-11
28.06.2009	55011.458	13.67	14.23	14.83	–	Sch	FLI

Table A5. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
14.07.2009	55027.412	13.70	14.29	14.91	–	Sch	FLI
15.07.2009	55028.380	13.62	14.19	14.80	15.82	Sch	FLI
21.08.2009	55065.292	13.66	14.25	14.86	15.89	Sch	FLI
06.10.2009	55111.330	13.69	–	14.89	15.92	Sch	FLI
08.10.2009	55113.243	13.66	14.26	14.89	15.93	Sch	FLI
20.11.2009	55156.197	13.66	14.23	14.83	15.81	Sch	FLI
21.11.2009	55157.227	13.67	14.25	14.86	15.87	Sch	FLI
13.05.2010	55330.436	13.66	14.26	14.89	15.90	Sch	FLI
10.06.2010	55358.424	13.67	14.26	14.89	15.90	Sch	FLI
06.08.2010	55415.466	13.67	14.29	14.91	15.90	Sch	FLI
07.08.2010	55416.433	13.73	14.33	15.00	16.02	Sch	FLI
07.09.2010	55447.420	13.66	14.26	14.87	15.86	Sch	FLI
08.09.2010	55448.326	13.69	14.30	14.90	15.89	Sch	FLI
09.09.2010	55449.407	13.74	14.36	14.99	16.01	Sch	FLI
31.10.2010	55501.195	13.72	14.33	14.96	15.94	Sch	FLI
02.11.2010	55503.223	13.73	14.36	14.96	15.97	Sch	FLI
03.11.2010	55504.195	13.75	14.34	14.97	15.98	Sch	FLI
04.11.2010	55505.202	13.69	14.31	14.94	15.93	Sch	FLI
05.11.2010	55506.226	13.72	14.34	14.94	15.94	Sch	FLI
06.11.2010	55507.224	13.77	14.38	15.01	16.04	Sch	FLI
01.01.2011	55563.169	13.72	14.32	14.93	15.96	Sch	FLI
07.02.2011	55600.202	13.76	14.38	15.04	–	Sch	FLI
08.02.2011	55600.671	13.71	14.31	14.91	–	Sch	FLI
04.04.2011	55656.509	13.67	14.26	14.85	15.83	Sch	FLI
21.05.2011	55703.384	13.67	14.25	14.82	15.85	Sch	FLI
22.05.2011	55704.430	13.71	14.31	14.92	15.95	Sch	FLI
23.05.2011	55705.408	13.77	14.41	15.04	16.09	Sch	FLI
24.05.2011	55706.382	13.65	14.23	14.82	15.82	Sch	FLI
25.05.2011	55707.390	13.72	14.29	14.95	15.95	Sch	FLI
09.06.2011	55722.425	13.72	14.37	14.99	16.05	Sch	FLI
21.06.2011	55734.420	13.81	14.42	15.06	16.07	Sch	FLI
22.06.2011	55735.452	13.66	14.26	14.86	15.89	Sch	FLI
23.06.2011	55736.443	13.70	14.34	14.92	15.94	Sch	FLI
24.06.2011	55737.443	13.77	14.34	14.95	15.95	Sch	FLI
27.07.2011	55770.361	13.61	14.19	14.78	15.79	Sch	FLI
23.08.2011	55797.323	13.72	14.32	14.93	15.94	Sch	FLI
24.08.2011	55798.301	13.76	14.38	15.01	16.03	Sch	FLI
25.08.2011	55799.318	13.63	14.21	14.82	15.79	Sch	FLI
23.09.2011	55828.249	13.73	14.29	14.91	15.89	Sch	FLI
27.11.2011	55893.176	13.68	14.27	14.88	15.94	Sch	FLI
28.11.2011	55894.175	13.75	14.35	14.98	15.98	Sch	FLI
29.11.2011	55895.167	13.71	14.27	14.88	15.88	Sch	FLI
30.11.2011	55896.179	13.71	14.30	14.92	15.95	Sch	FLI
29.12.2011	55925.169	13.69	14.31	14.92	15.94	Sch	FLI
01.01.2012	55928.185	13.74	14.34	14.97	16.01	Sch	FLI
16.03.2012	56003.563	13.69	14.26	14.89	15.92	Sch	FLI
13.04.2012	56030.508	13.83	14.46	15.09	16.12	Sch	FLI
12.05.2012	56060.415	13.79	14.36	14.99	15.99	Sch	FLI
20.05.2012	56068.399	13.82	14.45	15.06	15.94	Sch	FLI
12.06.2012	56091.398	13.74	14.36	14.99	16.02	Sch	FLI
13.06.2012	56092.383	13.76	14.38	14.98	16.01	Sch	FLI
17.06.2012	56096.398	13.63	14.17	14.77	15.76	Sch	FLI
11.07.2012	56120.377	13.69	14.29	14.93	15.97	Sch	FLI
12.07.2012	56121.338	13.79	14.40	15.01	15.99	Sch	FLI
13.07.2012	56122.399	13.67	14.23	14.83	15.81	Sch	FLI
14.07.2012	56123.387	13.74	14.38	14.99	16.02	Sch	FLI
19.08.2012	56159.351	13.70	14.30	14.93	15.90	Sch	FLI
20.08.2012	56160.329	13.69	14.25	14.88	15.88	Sch	FLI
21.08.2012	56161.346	13.75	14.37	15.03	16.02	Sch	FLI
22.08.2012	56162.338	13.73	14.32	14.94	15.94	Sch	FLI
04.09.2012	56175.426	13.77	14.39	15.01	16.05	Sch	FLI
05.09.2012	56176.272	13.79	14.38	15.03	16.02	Sch	FLI

Table A5. Continued

Date	J.D. (24...)	<i>I</i>	<i>R</i>	<i>V</i>	<i>B</i>	Tel	CCD
08.09.2012	56179.272	13.79	14.41	14.99	16.01	60-cm	FLI
09.09.2012	56180.364	13.72	14.25	14.84	15.85	60-cm	FLI
22.09.2012	56193.339	13.76	14.38	15.01	16.01	Sch	FLI
23.09.2012	56194.322	13.70	14.30	14.89	15.90	Sch	FLI
07.10.2012	56208.210	13.72	14.32	14.95	15.99	Sch	FLI
08.10.2012	56209.204	13.70	14.29	14.91	15.91	Sch	FLI
09.10.2012	56210.193	13.70	14.27	14.87	15.86	Sch	FLI
10.10.2012	56211.461	13.73	–	14.98	–	Sch	FLI
25.10.2012	56226.240	13.72	14.32	14.97	15.93	Sch	FLI
26.10.2012	56227.401	13.72	14.34	14.97	15.93	Sch	FLI
30.10.2012	56231.322	13.79	14.40	15.01	16.05	60-cm	FLI
17.11.2012	56249.172	13.77	14.38	14.99	16.02	Sch	FLI
18.11.2012	56250.181	13.70	14.28	14.91	15.91	Sch	FLI
31.12.2012	56293.254	13.72	14.32	14.92	15.94	Sch	FLI
01.01.2013	56294.228	13.67	14.23	14.83	15.81	60-cm	FLI
03.01.2013	56296.273	13.74	14.30	14.87	15.85	60-cm	FLI
16.01.2013	56309.243	13.73	14.32	14.92	15.96	Sch	FLI
05.02.2013	56329.196	13.62	14.21	14.80	15.83	Sch	FLI
06.03.2013	56357.595	13.77	14.32	14.93	–	60-cm	FLI
10.04.2013	56392.510	13.74	14.37	15.03	15.98	Sch	FLI
11.04.2013	56394.482	13.66	14.23	14.86	15.86	Sch	FLI
02.05.2013	56415.418	13.71	14.31	14.91	15.93	Sch	FLI
15.05.2013	56428.404	13.68	14.26	14.87	15.85	60-cm	FLI
17.05.2013	56430.408	13.80	14.39	15.02	16.03	60-cm	FLI
30.05.2013	56443.367	13.69	14.26	14.86	15.84	Sch	FLI
31.05.2013	56444.354	13.61	14.20	14.82	15.81	Sch	FLI
04.08.2013	56509.288	13.79	14.40	15.05	16.07	Sch	FLI
05.08.2013	56510.369	13.62	14.17	14.77	15.75	60-cm	FLI
05.08.2013	56510.386	13.61	14.17	14.80	15.78	Sch	FLI
06.08.2013	56511.411	13.79	14.43	15.06	16.08	Sch	FLI
06.08.2013	56511.413	13.77	14.38	15.02	16.03	60-cm	FLI
07.08.2013	56512.398	13.68	14.26	14.90	15.89	Sch	FLI
07.08.2013	56512.403	13.66	14.20	14.80	15.81	60-cm	FLI
08.08.2013	56513.382	13.64	14.19	14.78	15.83	60-cm	FLI
09.09.2013	56514.350	13.78	14.42	15.07	16.05	60-cm	FLI
12.08.2013	56517.284	13.70	14.29	14.89	15.85	60-cm	FLI
04.09.2013	56540.274	13.66	14.26	14.86	15.91	Sch	FLI
05.09.2013	56541.322	13.73	14.32	14.95	15.96	Sch	FLI
06.09.2013	56542.381	13.62	14.21	14.79	15.81	Sch	FLI
11.09.2013	56547.383	13.67	14.23	14.84	15.80	60-cm	FLI
14.09.2013	56550.363	13.70	14.23	14.86	15.89	60-cm	FLI
07.11.2013	56604.264	13.71	14.30	14.93	15.95	60-cm	FLI
28.12.2013	56655.200	13.70	14.28	14.88	15.88	Sch	FLI
29.12.2013	56656.180	13.64	14.21	14.81	15.82	Sch	FLI
30.12.2013	56657.193	13.84	14.48	15.11	16.13	Sch	FLI
23.01.2014	56681.189	13.73	14.30	14.91	15.91	Sch	FLI
22.03.2014	56738.590	13.85	14.48	15.10	16.13	Sch	FLI
21.05.2014	56799.425	13.71	14.29	14.89	15.91	Sch	FLI
28.06.2014	56837.417	13.73	14.36	15.00	16.04	Sch	FLI
29.06.2014	56838.398	13.76	14.38	15.01	16.03	Sch	FLI
24.07.2014	56863.339	13.70	14.27	14.87	15.90	Sch	FLI
25.07.2014	56864.356	13.82	14.43	–	–	Sch	FLI
03.08.2014	56873.386	13.73	14.35	14.95	15.98	Sch	FLI
04.08.2014	56874.407	13.70	14.25	14.86	15.82	Sch	FLI
18.08.2014	56888.450	13.73	14.32	14.93	15.94	Sch	FLI
19.08.2014	56889.365	13.67	14.27	14.88	15.88	Sch	FLI
13.12.2014	57005.181	13.68	14.30	14.84	15.83	Sch	FLI
14.12.2014	57006.220	13.66	14.25	–	–	Sch	FLI