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The β Pictoris association: Catalog of photometric rotational periods of low-mass members and candidate members⋆,⋆⋆,⋆⋆⋆

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ABSTRACT

Aims. We intended to compile the most complete catalog of bona fide members and candidate members of the β Pictoris association, and to measure their rotation periods and basic properties from our own observations, public archives, and exploring the literature.

Methods. We carried out a multi-observatories campaign to get our own photometric time series and collected all archived public photometric data time series for the stars in our catalog. Each time series was analyzed with the Lomb-Scargle and CLEAN periodograms to search for the stellar rotation periods. We complemented the measured rotational properties with detailed information on multiplicity, membership, and projected rotational velocity available in the literature and discussed star by star.

Results. We measured the rotation periods of 112 out of 117 among bona fide members and candidate members of the β Pictoris association and, whenever possible, we also measured the luminosity, radius, and inclination of the stellar rotation axis. This represents to date the largest catalog of rotation periods of any young loose stellar association.

Conclusions. We provided an extensive catalog of rotation periods together with other relevant basic properties useful to explore a number of open issues, such as the causes of spread of rotation periods among coeval stars, evolution of angular momentum, and lithium-rotation connection.

Key words. stars: activity – stars: late-type – starspots – open clusters and associations: individual: β Pictoris association – binaries: close – stars: rotation

⋆ Tables 1 and 2 are also available at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/600/A83

⋆⋆ Table 3 is only available at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/600/A83

⋆⋆⋆ Based on observations obtained at the Canada-France-Hawaii Telescope (CFHT) which is operated by the National Research Council of Canada, the Institut National des Sciences de l'Univers of the Centre National de la Recherche Scientique of France, and the University of Hawaii.

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1. Introduction

β Pictoris is a nearby young loose stellar association. Its members have distances from the Sun in the range 10–80 pc with an average value of about 40 ± 17 pc, and an age of about 25 ± 3 Myr (Messina et al. 2016c, Paper II). Youth and proximity make this association a special benchmark in stellar astrophysics studies. Many studies have payed attention to this association (see, e.g., Torres et al. 2006, 2008; Lépine & Simon 2009; Kiss et al. 2011; Schlieder et al. 2010, 2012; Shkolnik et al. 2012; Malo et al. 2013, 2014a,b), thereby providing a significantly increased number of bona fide and new candidate members by about a factor 3 with respect to the association members detected in the discovery studies (e.g., Zuckerman et al. 2001).

In particular, the stellar rotation period is a key basic parameter. Its knowledge, supplemented with information about other basic stellar properties, allows the exploration of a number of open issues related to the β Pictoris association. Amongst others, the impact of rotation on the lithium depletion (Messina et al. 2016c, Paper II) and the origin of the rotation period spread among stars of similar mass and age (Messina et al., in prep., Paper III). Moreover, the angular momentum evolution of young low-mass stars, the lifetime of primordial disks and the timescale of the star-disk locking phase can all be probed by means of the rotation of the star (see, e.g., Messina et al. 2014, 2015a,c). The rotation period of individual members is also relevant information in the radial velocity search for planetary companions. In fact, it helps to disentangle apparent radial velocity (RV) variations induced by the stellar magnetic activity from Doppler RV variations of Keplerian nature and to remove the activity noise in the RV time series.

The first comprehensive rotational investigation of the low-mass (spectral types F to M) members of the β Pictoris association was carried out by Messina et al. (2010, 2011). They were able to measure 33 rotation periods on a total of 38 stars, among members and candidate members compiled from Zuckerman et al. (2001), Song et al. (2003), Zuckerman & Song (2004), and Torres et al. (2006, 2008).

Given the relevance of the rotation periods in several astrophysical open issues, in this work (Paper I) we have compiled the most complete catalog of low-mass members and candidate members of this association known to date and engaged a project to measure the rotation periods for all the stars in this catalog.

For the present work, we carried out a multi-observatories campaign dedicated to measure the rotation periods of 117 low-mass stars that are either bona fide members or candidate members of the β Pictoris association. In Sect. 2, we present the bibliographic sources to select our stellar sample. In Sect. 3, we describe the main characteristics of the 13 observatories where we obtained our own observations. In Sect. 4, we describe the method to perform the data reduction of these observations, and in Sect. 5, we perform the periodogram analyses for all the time series. In Sect. 6, we mention the method used to derive the basic stellar parameters, and in Sect. 7 we detail the whole catalog. Finally in the Appendix, we present our results and the main characteristics mentioned in the literature for each star individually.

2. Sample description

We have carried out an extensive search in the literature to retrieve all members and candidate members of the β Pictoris association. We compiled a list of 117 stars, with spectral types later than about F3V, from the following major studies: Torres et al. (2006, 2008), Lépine & Simon (2009), Kiss et al. (2011), Schlieder et al. (2010, 2012), Shkolnik et al. (2012), Malo et al. (2013; 2014a,b), and others that are listed in the appendix dedicated to the individual targets. Stars of earlier spectral types were excluded from our sample since the photometric rotation period requires the presence of magnetic activity (more specifically, of light rotational modulation by starspots) to be measured, which is possible in later spectral type stars with sufficiently deep convection zones.

We measured the rotation periods of 112 out of 117 stars either from our own photometric monitoring or from photometric time series in public archives. For a few stars we adopted the rotation periods available in the literature.

Information on the membership is not homogeneous for all the targets either for the number of studies or for the methods used to determine this membership. For example, we found more than four membership studies for 52 targets, whereas we found only one membership study for 52 targets. In the present catalog we included all those stars that were considered members or candidate members in one membership study, at least. In a forthcoming paper (Paper III), the rotation periods presented in this catalog, together with information on RV, proper motion, distance, and activity indicators, will be used to assess the membership of each target.

3. Observations

The photometric rotation periods presented in this catalog were inferred from the analysis of new observations carried out by us and from photometric time series available in public archives.

3.1. New photometry

Our own photometric observations were carried out at 13 different observatories: seven located at southern latitudes and six at northern latitudes. In the following paragraphs, we give relevant information for each of them.

3.1.1. Harlingten Atacama Observatory (HAO)

The Harlingten Atacama Observatory is located in the Atacama Desert close to the town of San Pedro de Atacama, Chile (−22°57′10″; 68°10′49″W; 2450 m a.s.l.). It is operated by P. Kehusmaa. The telescope is a 51 cm $f/6.85$ PlaneWave CDK with a 28′ × 28′ field of view (FoV) and a plate scale of 0.83″/pixel. It is equipped with an Apogee Alta U42 CCD and Johnson/Cousins V, Rc filters.

3.1.2. Yandra Street Vale Park Observatory (YSVP)

The YSVP Observatory is located close to Vale Park, South Australia, Australia (−34°53′04″; 138°37′51″E; 44 m a.s.l.). It is operated by I. Curtis. The telescope is a 23.5 cm $f/10$ ($f6/3$ with focal reducer) Schmidt-Cassegrain on a German Equatorial mount with a 16.6′ × 12.3′ FoV and a plate scale of 0.6″/pixel. It is equipped with a cooled 1620 × 1220 pixels Atik-320E CCD with 4.4 μm pixel size, Johnson *UBVRI* filters and the CBB blue-blocking filter for exoplanet observations.

3.1.3. York Creek Observatory (YCO)

The York Creek Observatory is located close to Launceston, Tasmania, Australia (−41°06′06″; 146°50′33″E; 28 m a.s.l.). It is operated by M. Millward. The telescope is a 25 cm $f/10$

Takahashi Mewlon reflector, equipped with a QSI 683ws-8 camera, and *BVR* standard Johnson-Cousins filters. The telescope has a 24.5′×18.5′ FoV, and a plate scale of 0.44″/pixel.

3.1.4. Klein Karoo Observatory (KKO)

The Klein Karoo Observatory is located close to Klein Karoo, Western Cape, South Africa (−33°45′00″; 21°00′00″E). It is operated by B. Monard. The telescope is a 30 cm $f/8$ RCX-400 with a 21′ × 14′ FoV, and a plate scale of 0.82″/pixel. It is equipped with a SBIG ST8-XME CCD camera and $BV(RI)_c$ filters.

3.1.5. Montcabrer Observatory (MO)

The Montcabrer Observatory is close to Montcabrer, Spain (+41°31′11″; 02°23′39″E, 100 m a.s.l.). It is operated by R. Naves. The telescope is a 30 cm $f/6$ Meade LX-200 with a 26.3′ × 17.5′ FoV and a plate scale of 1.03″/pixel. It is equipped with a SBIG ST-8 CCD camera, an AO-8T active optics unit, and Bessel BVRI filters.

3.1.6. Crimean Astronomical Observatory (CrAO)

The Crimean Astronomical Observatory is located nearby Nauchny, Crimea (+44°43′37″; 34°01′02″E; 600 m a.s.l.). Photometric observations were performed by S. Artemenko and A. Savuskin. In this study we used the 0.5 m Maksutov telescope with a 12.2′ × 12.2′ FoV and a plate scale of 0.71″/pixel. It is equipped with a 1024 × 1024 pixel Apogee Alta U6 CCD camera and *V*, *R* Johnson filters. We also used the 1.25 m Ritchey-Chrétien telescope with 10.9′ × 10.9′ FoV and a plate scale of 0.32″/pixel. It is equipped with a 2048 × 2048 pixel FLI ProLine PL230 CCD camera and the same filters as the other telescope.

3.1.7. Xinglong station Observatory

The Xinglong station Observatory is close to Xinglong, Yanshan, China (+40°23′39″; 117°34′30″E, 960 m a.s.l.) and is a facility of the National Astronomical Observatory of China. Photometric observations were collected by L. Zhang and Q. Pi. The telescope is a 80 cm $f/3.27$ with a 16.5′ × 16.5′ FoV and a plate scale of 0.96″/pixel. It is equipped with a 1024×1024 pixel Marconi cooled CCD47-20 camera (13 μm pixel size), and standard Johnson-Cousin-Bessel *BVRI* filters.

3.1.8. Aryabhatta Research Institute of Observational Sciences (ARIES)

The Aryabhatta Research Institute of Observational Sciences is located close to Manora Peak, Nainital, India (+29°22′49″; 79°27′47″E). Observations were collected by B. J. Medhi. The telescope is a 104 cm $f/13$ Cassegrain with a 13′ × 13′ FoV and a plate scale of 0.366″/pixel. It is equipped with a 2K × 2K CCD camera.

3.1.9. Complejo Astronómico El Leoncito (CASLEO)

The Complejo Astronómico El Leoncito Observatory is located close to San Juan, Argentina (−31°47′57″; 69°18′ 12″W; 2552 m a.s.l.). Photometric observations were performed by A. Buccino, R. Petrucci, and E. Jofré. For this study we used the Horacio Ghielmetti Telescope (THG), which is a 40 cm $f/8$ remotely operated MEADE-RCX 400 Ritchey-Chretien telescope with a 49′ × 49′ FoV and a plate scale of 0.57″/pixel. It is equipped with a 4096 × 4096 pixel Apogee Alta U16M camera (9 μm pixel size) and Johnson *UBVRI* and Clear filters (Petrucci et al. 2013).

3.1.10. Remote Observatory Atacama Desert Observatory (ROAD)

The Remote Observatory Atacama Desert is located in the Atacama Desert close to the town of San Pedro de Atacama, Chile (−22°57′10″; 68°10′49″W; 2450 m a.s.l.). It is operated by F.-J. Hambsch. The telescope is housed at SPACE (San Pedro de Atacama Celestial Exploration[1]). The telescope is a 40 cm $f/6.8$ Optimized Dall-Kirkham (ODK) from Orion Optics. It is equipped with a 4K×4K pixel FLI ML16803 CCD camera (9 μm pixel size) with a 40′ × 40′ FoV and BVI and Clear filters and a SA200 grating for low-resolution spectroscopy.

3.1.11. Zeta UMa Observatory

The Zeta UMa Observatory is located close to Madrid, Spain (+40°25′00″; 03°42′13″W; 709 m a.s.l.). The telescope is operated by M. Muro Serrano. The telescope is a 13 cm $f/5.7$ Takahashi refractor with a 80′ × 60′ FoV and a plate scale of 1.50″/pixel. It is equipped with a cooled QHY9 camera and a set of Johnson-Cousins *V*, *R*, and *I* filters.

3.1.12. Taurus Hill Observatory

The Taurus Hill Observatory is located close to Varkaus, Finland (+62°18′54″; 28°23′21″E, 160 m a.s.l.). The telescope is operated by V.-P. Hentunen. The telescope is a 35 cm $f/11$ SC Celestron on a Paramount ME German equatorial mount with 24′ × 16′ FoV and a plate scale of 0.95″/pixel. It is equipped with a 1530 × 1020 pixel SBIG ST-8XME KAF-1603 CCD camera (9 μm pixel size) and Johnson-Bessell *BVR* filters.

3.1.13. Perth Exoplanet Survey Telescope Observatory (PEST)

The Perth Exoplanet Survey Telescope is located close to Perth, Australia (−31°58′; 115°47′E; 24 m a.s.l.). It is operated by T.-G. Tan. The telescope is a 30 cm $f/10$ Schmidt-Cassegrain ($f/5$ with focal reducer) with 31′ × 21′ FoV and a plate scale of 1.2″/pixel. It is equipped with a 1550 × 1050 pixel SBIG ST-8XME CCD camera with a filter wheel loaded with $BV(RI)_c$ and Clear filters. Focusing is computer controlled with an Optec TCF-Si focuser.

3.2. Archival data

A large number of members and candidate members of the β Pictoris association has photometric time series in one or more of the following public archives: ASAS (All Sky Automated Survey; Pojmanski 1997), SuperWASP (Wide Angle Search for Planets; Butters et al. 2010), INTEGRAL/OMC (Domingo et al. 2010), HIPPARCOS (ESA 1997), NSVS (Northern Sky Variability Survey; Woźniak et al. 2004), MEarth (Berta et al. 2012), and CSS (Catalina Sky Survey; Drake et al. 2009). We have retrieved and analyzed all these available time series for the period search.

[1] http://www.spaceobs.com/index.html

In the Appendix, we indicate which archives were used for each star individually.

4. Data reduction

Although the new observations we have collected come from different telescopes and instruments (see Sect. 3.1), we adopted similar reduction procedures. Briefly, we used the tasks within IRAF[2] for bias correction and flat fielding. Then, we used the technique of aperture photometry to extract magnitude time series for the targets and for other nearby stars detected in the frames to search for suitable comparison stars. For a few targets, differential magnitude time series were computed with respect to one comparison star. However, whenever it was possible we preferred to compute differential values with respect to an ensemble comparison star. Generally, on each telescope pointing we collected five consecutive frames per filter. The corresponding differential magnitudes were subsequently averaged to get one average magnitude and its standard deviation, which is considered the measure of the photometric precision we obtained. After visual inspection of the light curves to identify possible flare events, we applied a 3σ clipping to remove possible outliers.

5. Period search methods

To search for the stellar rotation periods of our targets, we followed an approach similar to that used in Messina et al. (2010, 2011). Those papers provide a detailed description of the method.

Briefly, the period search was carried out by computing the Lomb-Scargle periodogram (LS; Press et al. 2002; Scargle 1982; Horne & Baliunas 1986) and the CLEAN periodogram (Roberts et al. 1987). The false alarm probability (FAP) associated with our detected period, which is the probability that a peak of given height in the periodogram is caused simply by statistical variations, i.e., Gaussian noise, was computed through Monte Carlo simulations, i.e., by generating 1000 artificial light curves obtained from the real light curve, keeping the date but permuting the magnitude values (see, e.g., Herbst et al. 2002). For our following analysis, we considered only rotation periods that were measured with a confidence level larger than 99% (FAP < 0.01).

When data from more observation seasons were available, we computed LS and CLEAN periodograms for the complete series and for each season. The detection of the same periodicity in more (hopefully all) time sections further supports that the recurrent periodicity is the rotation period. Three targets could be observed at more observatories. In these cases, we performed the periodogram analysis on each time series and on their combination. In the latter case, the shorter time series was aligned by applying a magnitude shift to the mean magnitude of the longer time series whenever necessary. This is a reasonable procedure since observations at different sites of the same target were performed almost contemporarily, ruling out effects from intrinsic long-term variations of the mean magnitude. We followed the method used by Lamm et al. (2004) to compute the errors associated with the period determinations (see, e.g., Messina et al. 2010, for details). To derive the light curve amplitude, we fit the data with a sinusoid function whose period is equal to the stellar rotation period.

As result of our photometric analysis, we obtained the rotation periods of 112 out of 117 target stars. Specifically, we collected new photometric time series for 31 targets. We measured 51 new rotation periods: 16 from our own photometry, 21 from archived data, and 14 from both our own and archived data. We confirmed 28 previously known rotation periods: 6 using our own photometry and 22 using archived data. Finally, we adopted the rotation periods retrieved from the literature for 33 targets (of which 17 periods where retrieved from Messina et al. 2010, 2011). We did not obtain the rotation period neither from our periodogram analysis nor from the literature for the remaining 5 targets.

In Figs. 1 and 2, we give two examples that summarize the results of our period search carried out on our own photometric time series (the case of 2MASS J01365516-0647379) and on archive time series (the case of 2MASS J20055640-3216591).

We produced similar plots for all the photometric time series (either new or from archives) analyzed in this work and used to measure the rotation period. These plots are available in Figs. A.1–A.73.

6. Basic stellar parameters

We use the V magnitudes and distances listed in Table 1, and the bolometric corrections for young stars tabulated by Pecaut & Mamajek (2013) to infer the absolute bolometric magnitudes that are transformed into luminosities. From the luminosities and effective temperatures, which are inferred from $V - K_s$ colors using the $T_{\rm eff} - (V - K_s)$ relations from Pecaut & Mamajek (2013), we derive the stellar radii. Uncertainties on luminosity and radius are computed according to the error propagation. Finally, we use the stellar radii and projected rotational velocities listed in Table 1 to infer the $\sin i$ values and hence the inclination of the stellar rotation axis.

These quantities are given in the Appendix and computed only for single stars and wide (resolved) components of multiple systems for which the V magnitude and the $V-K_s$ color are accurately measured. To minimize the impact of variability owing to magnetic activity, we use the brightest (presumably unspotted) V magnitude ever observed.

7. Catalog description

Our catalog is presented in three tables. Table 1 lists the target name, coordinates, V magnitude, $B - V$, $V - I$, and $V - K_s$ colors, distance to the Sun, projected rotational velocity, spectral type classification, and separation between the components of multiple systems. The references are given in the Appendix in the discussion on each individual target. Table 2 lists the target name, photometric rotation period and its uncertainty, light curve amplitude, photometric precision, flag on the multiplicity, another designation name for the target, the source of the photometric time series used to derive the mentioned period, the photometric filter, and the starting and ending Julian Day of the time series. S, B, and T indicate a single star, component of a binary system, and a component of a triple system, respectively. The letter w and c indicate that the target is component of a binary/multiple system in a close orbit (projected separation between the components <80 AU) or in a wide orbit (≥80 AU), according to Paper III (Messina et al., in prep.). The letter D indicates the presence of a debris disk. The question mark "?" indicates those targets whose single/binary nature is not known yet. Table 3 contains the photometric time series either collected

[2] IRAF is distributed by the National Optical Astronomy Observatory, which is operated by the Association of the Universities for Research in Astronomy, inc. (AURA) under cooperative agreement with the National Science Foundation.

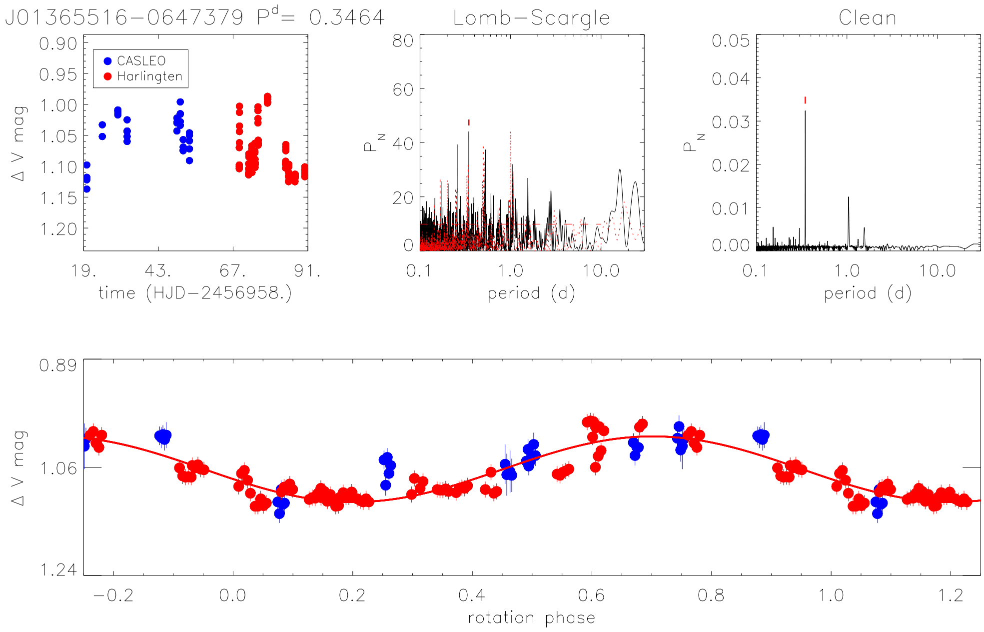

Fig. 1. Results of periodogram analysis of 2MASS J01365516-0647379. In the *top left panel* we plot magnitudes vs. heliocentric Julian Day. Different colors are used to distinguish data collected at CASLEO from data collected at HAO. In the *top middle panel* we plot the Lomb-Scargle periodogram with the spectral window function and power level corresponding to FAP = 1% (horizontal dashed line) overplotted (red dotted line), and we indicate the peak corresponding to the rotation period. In the *top right panel* we plot the CLEAN periodogram. In the *bottom panel* we plot the light curve phased with the rotation period. The solid line represents the sinusoidal fit.

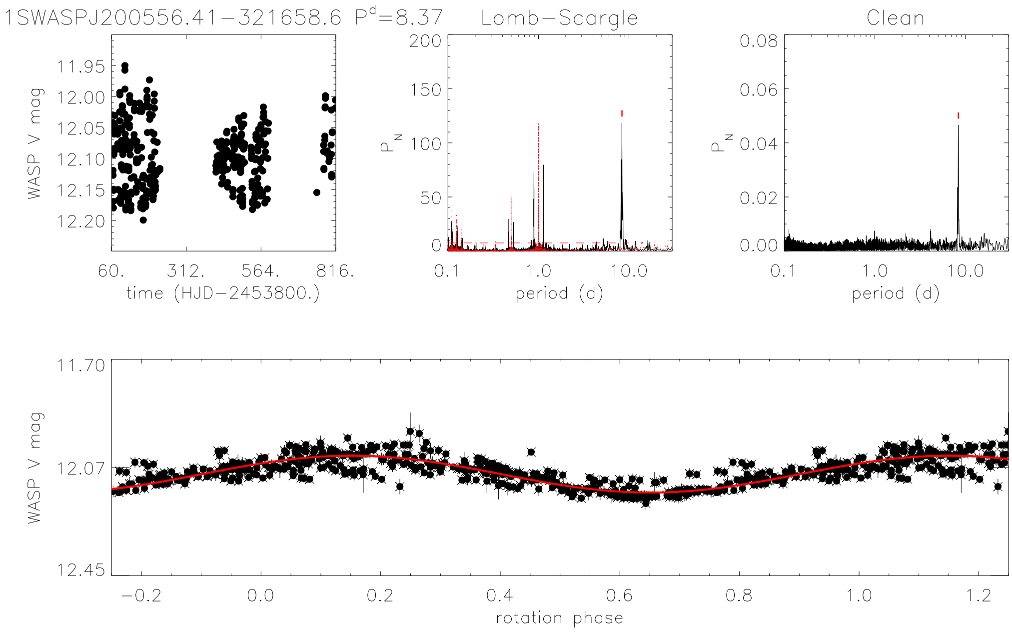

Fig. 2. Same as in Fig. 1, but for the SuperWASP data of 2MASS J20055640-3216591.

by us or retrieved from the mentioned public archives and used to measure the rotation periods.

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Table 1. List of β Pictoris members with coordinates, V magnitude and colors, distance, projected rotational velocity, spectral type and separation between the components for multiple systems.

Target	RA (J2000)	Dec (J2000)	V (mag)	$B-V$ (mag)	$V-I$ (mag)	$V-K_s$ (mag)	d (pc)	$v \sin i$ (km s^{-1})	Sp.T	Sep (AU)
HIP 560	00 06 50.08	–23 06 27.20	6.15	0.39	0.45	0.91	39.1	170.0	F3V	–
J00172353-6645124	00 17 23.54	–66 45 12.50	12.35	1.48	2.41	4.65	37.5	6.3	M2.5V	–
TYC 1186 0706 1	00 23 34.66	20 14 28.75	10.96	1.40	1.75	3.62	59.7	4.5	K7.5V+M5	101.5
GJ 2006A	00 27 50.23	–32 33 06.42	12.87	1.50	2.66	4.86	32.3	6.2	M3.5Ve	577.3
GJ 2006B	00 27 50.35	–32 33 23.86	13.16	1.50	2.77	5.04	32.3	4.2	M3.5Ve	577.3
J00323480+0729271A	00 32 34.81	07 29 27.10	13.40	1.53	2.78	5.02	41.1	17.0	M4V	32.5
J00323480+0729271B	00 32 34.81	07 29 27.10	12.62	1.53	3.05	5.68	41.1	15.0	>M5	32.5
TYC 5853 1318 1	01 07 11.94	–19 35 36.00	11.41	1.40	1.80	4.16	43.0	9.1	M1V	–
J01112542+1526214A	01 11 25.42	15 26 21.50	14.46	1.65	3.35	6.25	21.8	17.9	M5V	8.9
J01112542+1526214B	01 11 25.42	15 26 21.50	14.46	1.70	3.63	6.55	21.8	17.9	M6V	8.9
J01132817-3821024	01 13 28.17	–38 21 02.50	11.77	1.43	2.08	4.17	29.0	9.1	(M0V+M3V)+M1V	0.0
J01351393-0712517	01 35 13.93	-07 12 51.77	13.42	1.54	2.87	5.50	37.9	55.1	M4.5V	0.0
J01365516-0647379	01 36 55.16	-06 47 37.92	14.00	1.53	2.78	5.14	24.0	10.0	M4V+L0	134.2
TYC 1208 0468 1	01 37 39.42	18 35 32.91	9.83	1.31	1.45	3.11	60.0	21.5	K3V+K5V	103.8
J01535076-1459503	01 53 50.77	–14 59 50.30	11.97	1.50	2.62	4.90	28.0	11.2	M3V+M3V	80.7
J02014677+0117161	02 01 46.78	01 17 16.20	12.78	1.46	2.28	4.51	63.7	–	M	–
RBS 269	02 01 46.93	01 17 06.00	12.72	1.58	2.60	4.46	63.7	–	M	–
J02175601+1225266	02 17 56.01	12 25 26.70	13.62	1.45	2.26	4.54	67.9	22.6	M3.5V	–
HIP 10679	02 17 24.74	28 44 30.43	7.75	0.62	0.69	1.49	37.6	7.8	G2V	519.0
HIP 10680	02 17 25.28	28 44 42.16	6.95	0.52	0.59	1.16	37.6	37.5	F5V	519.0
HIP 11152	02 23 26.64	+22 44 06.75	11.09	1.44	1.65	3.74	28.7	6.0	M3V	–
HIP 11437A	02 27 29.25	30 58 24.60	10.12	1.18	1.32	3.04	42.3	5.0	K4V	930.8
HIP 11437B	02 27 28.05	30 58 40.53	12.44	1.50	2.15	4.22	42.3	4.7	M1V	930.8
HIP 12545	02 41 25.90	05 59 18.00	10.37	1.21	1.46	3.30	42.0	9.0	K6Ve	–
J03350208+2342356	03 35 02.09	23 42 35.61	17.00	2.13	4.60	5.74	23.5	30.0	M8.5V	–
J03461399+1709176	03 46 14.00	17 09 17.45	12.90	1.43	2.00	4.08	64.0	–	M0.5	–
GJ 3305	04 37 37.30	-02 29 28.00	10.59	1.45	2.00	4.18	29.8	5.3	M1+M?	2.7
J04435686+3723033	04 43 56.87	37 23 03.30	12.98	1.46	2.30	4.18	59.0	10.6	M3Ve+M5?	531.1
HIP 23200	04 59 34.83	01 47 00.68	10.05	1.39	1.84	3.99	24.0	8.7	M0.5Ve	0.0
TYC 1281 1672 1	05 00 49.28	15 27 00.71	10.75	1.24	1.40	3.15	54.0	17.2	K2IV	–
HIP 23309	05 00 47.10	–57 15 25.00	10.00	1.40	1.79	3.76	26.2	5.8	M0Ve	–
J05015665+0108429	05 01 56.65	01 08 42.91	13.20	1.10	1.24	5.52	27.0	8.0	M4V	–
HIP 23418A	05 01 58.80	09 59 00.00	11.45	1.54	2.81	4.78	24.6	7.7	M3V	0.0
HIP 23418B	05 01 58.80	09 59 00.00	12.45	1.47	2.48	5.23	24.6	23.8	>M3V	16.7
BD-211074A	05 06 49.90	–21 35 09.00	10.29	1.51	2.16	4.35	19.2	4.5	M1.5V	157.9
BD-211074B	05 06 49.90	–21 35 09.00	11.67	1.50	2.58	4.64	19.2	6.5	M2.5V	15.4
J05082729-2101444	05 08 27.30	–21 01 44.40	14.70	1.60	3.09	5.87	25.0	25.3	M5.6V	–
TYC 112 1486 1	05 20 31.83	+06 16 11.48	11.67	0.98	1.40	3.11	71	17.0	K4V	30
TYC 112 917 1	05 20 00.29	+06 13 03.57	11.58	1.26	1.38	3.00	67.8	8	K4V	–
J05241914-1601153	05 24 19.15	–16 01 15.30	14.32	1.56	2.98	5.60	32.0	50.0	M4.5+M5	20.5
HIP 25486	05 27 04.76	–11 54 03.47	6.22	0.55	0.63	1.29	27.0	53.0	F7V	0.0
J05294468-3239141	05 29 44.68	–32 39 14.20	13.79	1.60	2.98	5.47	26.0	–	M4.5V	–
TYC 4770 0797 1	05 32 04.51	-03 05 29.38	11.32	1.45	2.22	4.31	42.0	12.0	M2V+M3.5V	8.4
J05335981-0221325	05 33 59.81	-02 21 32.50	12.42	1.49	2.52	4.72	42.0	5.4	M2.9V	–
J06131330-2742054	06 13 13.31	–27 42 05.50	12.09	1.49	2.71	5.23	29.4	6.7	M3.V:	0.0
HIP 29964	06 18 28.20	–72 02 41.00	9.80	1.13	1.32	2.99	38.6	16.4	K4Ve	–
J07293108+3556003AB	07 29 31.09	35 56 00.40	11.82	1.42	2.08	4.02	42.0	20.0	M1+M3	8.4
J08173943-8243298	08 17 39.44	–82 43 29.80	11.62	1.51	2.69	5.03	27.0	32.2	M3.5V	–
J08224744-5726530	08 22 47.45	–57 26 53.00	13.37	1.58	3.08	5.57	8.0	6.4	M4.5+L0	5.1
J09361593+3731456AB	09 36 15.91	37 31 45.50	11.09	1.44	2.06	4.10	33.7	6.0	M0.5+M0.5	0.0
J10015995+6651278	10 02 00.10	66 51 26.00	12.38	1.47	2.36	4.16	38.7	12.0	M3	–
HIP 50156	10 14 19.17	21 04 29.55	10.08	1.37	1.83	3.82	20.0	23.1	M0.5V+?	1.8
TWA 22	10 17 26.89	–53 54 26.50	13.99	1.54	2.86	6.30	17.5	9.7	M5+M6	1.8
BD+262161A	10 59 38.31	25 26 15.50	8.45	1.06	1.15	2.61	22.0	–	K2	115.7
BD+262161B	10 59 38.31	25 26 15.50	9.09	1.15	1.36	3.25	22.0	6.0	K5	115.7
J11515681+0731262	11 51 56.81	07 31 26.25	12.38	1.40	2.26	4.61	33.2	–	M2+M2+M8	16.6
J13545390-7121476	13 54 53.90	–71 21 47.67	12.24	1.46	2.44	4.57	21.0	3.1	M2.5V	–

Notes. 2MASSJ targets are abbreviated as J.

Table 1. continued.

Target	RA (J2000)	Dec (J2000)	V (mag)	$B-V$ (mag)	$V-I$ (mag)	$V-K_s$ (mag)	d (pc)	$v\sin i$ (km s^{-1})	Sp.T	Sep (AU)
HIP 69562A	14 14 21.36	–15 21 21.75	10.27	1.28	1.78	3.67	30.0	103.0	K5.5V+	9.0
HIP 69562B	14 14 21.36	–15 21 21.75	10.27	1.28	1.78	3.67	30.0	24.0	–	39.0
TYC 915 1391 1	14 25 55.93	14 12 10.14	10.89	1.08	1.20	3.60	51.8	–	K4V	–
HIP 76629	15 38 57.50	–57 42 27.00	7.97	0.82	0.88	2.12	39.7	16.6	K0V	0.0
J16430128-1754274	16 43 01.29	–17 54 27.50	12.50	1.41	2.02	3.95	59.0	8.8	M0.6	–
J16572029-5343316	16 57 20.30	–53 43 31.70	12.44	1.47	2.47	4.65	51.0	3.5	M3V	–
J17150219-3333398	17 15 02.20	–33 33 39.80	10.93	1.37	1.86	3.86	23.0	76.3	M0V	–
HIP 84586	17 17 25.50	–66 57 04.00	7.23	0.76	0.84	2.53	31.4	31.0	G5IV+K5IV	0.0
HD 155555C	17 17 31.29	–66 57 05.49	12.71	1.54	2.73	5.08	31.4	7.6	M3.5Ve	1036.4
TYC 8728 2262 1	17 29 55.10	–54 15 49.00	9.55	0.85	0.95	2.19	66.0	35.3	K1V	–
GSC 08350-01924	17 29 20.67	–50 14 53.00	13.47	1.46	2.56	4.77	64.0	23.5	M3V	51.2
HD 160305	17 41 49.03	–50 43 28.00	8.35	0.51	0.65	1.36	72.0	–	F9V	–
TYC 8742 2065 1	17 48 33.70	–53 06 43.00	8.94	0.83	0.91	2.16	74.0	10.0	K0IV+	0.0
HIP 88399	18 03 03.41	–51 38 56.43	12.50	0.46	0.53	4.23	47.0	–	M2V+F6V	302.7
V4046 Sgr	18 14 10.50	–32 47 33.00	10.44	1.18	1.43	3.19	72.0	14.2	K5V+K7V	0.0
UCAC2 18035440	18 14 22.07	–32 46 10.12	12.78	1.36	2.14	4.24	71.0	3.0	M1Ve	0.0
J18151564-4927472	18 15 15.64	–49 27 47.20	12.86	1.47	2.48	4.78	61.0	76.7	M3V	0.0
HIP 89829	18 19 52.20	–29 16 33.00	8.89	0.67	0.73	1.84	75.2	114.7	G1V	–
J18202275-1011131A	18 20 22.74	–10 11 13.62	10.63	1.18	1.44	3.35	61.0	–	K5Ve	81.1
J18202275-1011131B	18 20 22.74	–10 11 13.62	10.63	1.24	1.66	4.01	61.0	–	K7Ve	81.1
J18420694-5554254	18 42 06.95	–55 54 25.50	13.53	1.53	2.81	4.95	54.0	8.6	M3.5V	–
TYC 9077 2489 1	18 45 37.02	–64 51 46.14	9.30	1.20	1.54	3.20	29.2	150.0	K8Ve	5.3
TYC 9073 0762 1	18 46 52.60	–62 10 36.00	11.80	1.46	2.09	3.95	53.0	9.9	M1Ve	–
HD 173167	18 48 06.36	–62 13 47.02	7.28	0.50	0.55	1.14	54.0	–	F5V	0.0
TYC 7408 0054 1	18 50 44.50	–31 47 47.00	11.20	1.35	1.82	3.66	50.0	49.7	K8Ve	0.0
HIP 92680	18 53 05.90	–50 10 50.00	8.29	0.77	0.85	1.92	49.8	69.0	K8Ve	–
TYC 6872 1011 1	18 58 04.20	–29 53 05.00	11.78	1.30	1.80	3.76	78.0	33.8	M0Ve	–
J19102820-2319486	19 10 28.21	–23 19 48.60	13.20	1.50	2.63	4.99	67.0	12.2	M4V	–
TYC 6878 0195 1	19 11 44.70	–26 04 09.00	10.27	1.05	1.18	2.90	79.0	9.8	K4Ve	86.9
J19233820-4606316	19 23 38.20	–46 06 31.60	11.87	1.33	1.73	3.60	70.0	15.4	M0V	–
J19243494-3442392	19 24 34.95	–34 42 39.30	14.28	1.56	2.99	5.50	54.0	10.9	M4V	–
TYC 7443 1102 1	19 56 04.37	–32 07 37.71	11.80	1.40	1.80	3.95	55.0	6.0	M0.0V	1298.2
J19560294-3207186AB	19 56 02.94	–32 07 18.70	13.30	1.48	2.45	5.12	55.0	35.0	M4V	11.0
J20013718-3313139	20 01 37.18	–33 13 14.01	12.25	1.43	2.10	4.06	62.0	2.6	M1V	–
J20055640-3216591	20 05 56.41	–32 16 59.15	11.96	1.20	1.95	4.02	52.0	–	M2V	–
HD 191089	20 09 05.21	–26 13 26.52	7.18	0.48	0.55	1.10	52.0	37.7	F5V	–
J20100002-2801410AB	20 10 00.03	–28 01 41.10	13.62	1.52	2.77	4.64	48.0	46.5	M2.5+M3.5	29.3
J20333759-2556521	20 33 37.59	–25 56 52.20	14.87	1.65	3.30	5.99	48.3	21.0	M4.5V	–
HIP 102141A	20 41 51.20	–32 26 07.00	11.09	1.54	2.96	5.42	10.7	10.7	M4Ve	24.6
HIP 102141B	20 41 51.10	–32 26 10.00	11.13	1.55	2.96	5.42	10.7	10.7	M4Ve	24.6
J20434114-2433534	20 43 41.14	–24 33 53.19	12.83	1.51	2.72	4.97	28.1	44.0	M3.7+M4.1	41.3
HIP 102409	20 45 09.50	–31 20 27.00	8.73	1.47	2.10	4.20	9.9	9.3	M1Ve	–
HIP 103311	20 55 47.67	–17 06 51.04	7.35	0.54	0.62	1.54	48.0	115.0	F8V	52.8
TYC 634902001	20 56 02.70	–17 10 54.00	10.62	1.22	1.49	3.54	48.0	15.6	K6Ve+M2	105.6
J21100535-1919573	21 10 05.36	–19 19 57.40	11.54	1.40	1.97	4.34	32.0	9.7	M2V	–
J21103147-2710578	21 10 31.48	–27 10 57.80	15.20	1.59	3.04	5.60	41.0	15.8	M4.5V	389.6
J21103096-2710513	21 10 30.96	–27 10 51.30	15.72	1.66	3.31	5.60	41.0	14.6	M5V	389.6
HIP 105441	21 21 24.49	–66 54 57.37	8.77	1.10	1.26	2.37	30.2	5.9	K2V	785.3
TYC 9114 1267 1	21 21 28.72	–66 55 06.30	10.59	1.40	1.76	3.58	30.2	4.5	K7V	785.3
TYC 9486 927 1	21 25 27.49	–81 38 27.68	11.70	1.41	2.06	4.36	26.2	43.5	M1V	0.0
J21374019+0137137AB	21 37 40.19	01 37 13.70	13.36	1.56	3.00	5.48	39.2	39.0	M5V	17.3
J21412662+2043107	21 41 26.63	20 43 10.70	13.50	1.50	2.52	4.89	52.7	–	M3V	–
TYC 2211 1309 1	22 00 41.59	27 15 13.60	11.39	1.40	1.80	3.67	45.6	30.0	M0V	0.0
TYC 9340 0437 1	22 42 48.90	–71 42 21.00	10.60	1.35	1.73	3.71	36.0	7.5	K7Ve	–
HIP 112312	22 44 58.00	–33 15 02.00	12.10	1.50	2.78	5.17	23.6	12.1	M4Ve	778.9
TX Psa	22 45 00.05	–33 15 25.80	13.36	1.58	3.04	5.57	23.6	16.0	M4.5Ve	778.9
J22571130+3639451	22 57 11.31	36 39 45.14	12.50	1.46	2.34	3.86	69.0	20.0	M3V	–
TYC 5832 0666 1	23 32 30.90	–12 15 52.00	10.54	1.43	1.98	3.97	28.0	8.6	M0Ve	–
J23500639+2659519	23 50 06.39	26 59 51.93	14.26	1.53	2.57	4.96	25.0	36.0	M3.5V	–
J23512227+2344207	23 51 22.28	23 44 20.80	14.11	1.54	2.93	5.29	18.0	4.0	M4V	–

Table 2. Results of the photometric period search.

Target	P (d)	ΔP (d)	Δmag (mag)	σ (mag)	Mult.	Other name	Source	Filter	JD_{start}–JD_{end} (JD-2 400 000)
HIP 560	0.224	0.005	0.008	0.007	S+D	–	YSVP	I	57297–57 333
J00172353-6645124	6.644	0.027	0.100	0.012	S	–	INTEGRAL	V	52 856–56 669
TYC 1186 0706 1	7.9	0.1	0.070	0.028	Bw	FK Psc	literature	V	–
GJ 2006A	3.99	0.05	0.170	0.006	Bw	–	CASLEO	R	56 904–56 952
GJ 2006B	4.91	0.05	0.120	0.005	Bw	–	CASLEO	R	56 904–56 952
J00323480+0729271A	3.355	0.005	0.045	0.006	Bc	GJ3039A	MO+ARIES	R	56 948–57 016
J00323480+0729271B	0.925	0.008	0.045	0.006	Bc	GJ3039B	MO+ARIES	R	56 948–57 016
TYC 5853 1318 1	7.26	0.07	0.10	0.03	S?	–	literature	V	–
J01112542+1526214A	0.911	0.001	0.01	0.01	Bc	GJ 3076	MEarth	RG715	55 098–55 495
J01112542+1526214B	0.791	0.001	0.01	0.01	Bc	GJ 3076	MEarth	RG715	55 098–55 495
J01132817-3821024	0.446	–	0.210	–	Tc	–	literature	V	–
J01351393-0712517	0.703	–	0.080	–	SB2	–	literature	V	–
J01365516-0647379	0.346	0.001	0.11	0.01	Bw	–	CASLEO+HAO	V	56 919–56 989
TYC 1208 0468 1	2.803	0.010	0.07	0.02	Bw	–	literature	V	–
J01535076-1459503	1.515	–	0.110	–	BC	–	literature	V	–
J02014677+0117161	3.30/5.98	0.01	0.09	0.02	Bw	–	NSVS	V	51 426–51 576
RBS 269	5.98/3.30	0.01	0.09	0.02	Bw	–	NSVS	V	51 426–51 576
J02175601+1225266	1.995	0.005	0.05	0.005	S	–	ARIES	I	56 959–57 018
HIP 10679	0.777	0.005	0.070	0.006	Bw+D	–	literature	V	56 952–56 962
HIP 10680	0.240	0.001	0.030	0.006	Bw	–	literature	V	56 952–56 962
HIP 11152	1.80/3.60	0.02	0.06	0.01	S	–	SW	V	54 056–54 121
HIP 11437A	12.5	0.5	0.20	0.01	Bw+D	AG Tri	literature	V	56 634–57 091
HIP 11437B	4.66	0.05	0.16	0.01	Bw	–	literature	V	56 634–57 091
HIP12545	4.83	0.03	0.180	0.032	S	–	CrAO	V	57 321–57 381
J03350208+2342356	0.472	0.005	0.03	0.06	Bc?	–	NSVS	V	51 375–51 620
J03461399+1709176	1.742	0.001	0.07	0.01	S	–	literature	r	–
GJ 3305	4.89	0.01	0.05	0.05	Bc	–	ASAS	V	52 558–55 145
J04435686+3723033	4.288	–	–	–	Bw	V962_Per	literature	V	–
HIP 23200	4.430	0.030	0.150	0.032	SB1	V1005 Ori	literature	V	–
TYC 1281 1672 1	2.76	0.01	0.12	0.01	S	V1814 Ori	INTEGRAL	V	53 460–56 214
HIP 23309	8.60	0.07	0.110	0.031	S	–	ASAS	V	51 868–54 884
J05015665+0108429	2.08	0.02	0.07	0.01	S?	–	INTEGRAL	V	53 592–56 688
HIP 23418A	1.220	0.010	0.070	0.033	SB2	GJ3322A	ASAS	V	51 946–55 164
HIP 23418B	–	–	–	–	Tc	GJ3322B	–	–	–
BD-211074A	9.3	0.1	0.120	0.015	Tw	GJ3331	literature	R	–
BD-211074B	5.40	0.10	0.080	0.015	Tc	GJ3332	literature	R	–
J05082729-2101444	0.280	0.002	0.07	0.08	S	–	SW	V	53 993–54 509
TYC 112 1486 1	2.18	–	0.09	–	Tc	–	literature	V	–
TYC 112 917 1	3.51	–	0.08	–	Tw	–	literature	V	–
J05241914-1601153	0.401	0.001	0.15	0.05	Bc	–	Catalina	V	53 598–56 406
HIP 25486	0.966	0.002	0.10	0.01	SB2	AF Lep	literature	V	–
J05294468-3239141	1.532	0.005	0.03	0.05	S?	–	SW	V	53 993–54 509
TYC 4770 0797 1	4.372	0.002	0.160	0.031	Bc	V1311 Ori	INTEGRAL	V	54 005–56 685
J05335981-0221325	7.250	–	0.170	–	S	–	INTEGRAL	V	54 005–56 576
J06131330-2742054	16.8	1.0	0.07	0.01	Tc	–	YCO	V	57 009–57 140
HIP 29964	2.670	0.010	0.120	0.032	S+D	AO Men	literature	V	–
J07293108+3556003AB	1.970	0.010	0.10	0.02	Bc	–	SW	V	54 056–54 574
J08173943-8243298	1.318	–	0.050	–	Bc?	–	literature	V	–
J08224744-5726530	–	–	–	–	Tc	–	–	–	–
J09361593+3731456AB	12.9	0.3	0.030	0.016	SB2	GJ 9303	SW	V	54 066–54 604
J10015995+6651278	2.49	0.02	0.060	0.012	Bc?	–	INTEGRAL	V	55 122–56 846
HIP 50156	7.860	–	0.050	–	Bc	DK Leo	literature	V	–
TWA 22	0.830	0.010	0.020	–	Bc	–	INTEGRAL	V	52 669–56 988
BD+262161A	2.022/0.974	0.005	0.010	0.006	Bw+D	–	SW	V	54 091–54 225
BD+262161B	0.974/2.022	0.005	0.010	0.006	Bw	–	SW	V	54 091–54 225
J11515681+0731262	2.291	–	0.130	–	SB2	–	literature	V	–
J13545390-7121476	3.65	0.02	0.020	0.008	S?	–	YCO	V	56 823–56 921

Notes. We list the target's name, the photometric rotation period, and its uncertainty, the peak-to-peak light curve amplitude, the photometric accuracy, the single/binary nature of the target, another name, the source of the photometric time series, the filter, and the observation JD interval used to compute the rotation period. S: single; B: binary system; T: triple system; w: wide orbit (>60 AU); c: close orbit (<60 AU); D: debris disc host star; ?: uncertain single/binary nature.

Table 2. continued.

Target	P (d)	ΔP (d)	Δmag (mag)	σ (mag)	Mult.	Other name	Source	Filter	JD_{start}–JD_{end} (JD-2 400 000)
HIP 69562A	0.298	0.005	0.17	0.02	Tc	MV Vir	literature	V	–
HIP 69562B	–	–	–	–	Tc	MV Vir	–	–	–
TYC 915 1391 1	4.340	–	0.360	–	S	–	literature	V	–
HIP 76629	4.27	0.10	0.180	0.034	SB1	V343 Nor	literature	V	–
J16430128-1754274	5.14	0.04	0.140	0.031	S	–	literature	V	–
J16572029-5343316	7.15	0.05	0.020	0.008	S	–	YCO	V	56 823–56 929
J17150219-3333398	0.311	–	0.110	–	Bc?	–	INTEGRAL	V	52 698–56 578
HIP 84586	1.680	0.010	0.120	0.034	SB2	V824 Ara	YCO	V	56 717–56 788
HD 155555C	4.43	0.01	0.070	0.007	Tw	–	YCO	V	56 717–56 788
TYC 8728 2262 1	1.775	0.005	0.150	0.036	S	–	INTEGRAL	V	52 704–55 984
GSC 08350-01924	1.906	0.005	0.05	0.01	Bc	–	YCO	V	56 950–56 976
HD 160305	1.336	0.008	0.060	0.036	S+D	–	literature	V	–
TYC 8742 2065 1	2.60/1.62	0.01	0.060	0.033	Tc	–	literature	V	–
HIP 88399	–	–	–	–	Bw	–	–	–	–
V4046 Sgr	2.42	0.01	0.090	0.033	SB2+D	V4046 Sgr	literature	V	–
UCAC2 18035440	12.05	0.5	0.14	0.03	SB	–	literature	V	–
J18151564-4927472	0.447	0.002	0.130	0.008	SB1	–	YCO	V	56 800–56 929
HIP 89829	0.571	0.001	0.140	0.037	S	–	INTEGRAL	V	52 730–56 593
J18202275-1011131	4.65/5.15	–	0.070	–	Bw+D	FK Ser	ASAS	V	51 962–55 092
J18202275-1011131B	5.15/4.65	–	0.070	–	Bw	FK Ser	ASAS	V	51 962–55 092
J18420694-5554254	5.403	–	0.070	–	S?	–	literature	V	–
TYC 9077 2489 1	0.345	0.005	0.160	0.033	Tc	–	literature	V	–
TYC 9073 0762 1	5.37	0.04	0.320	0.032	S	–	INTEGRAL	V	54 403–55 984
HD 173167	0.290	0.005	0.220	0.033	SB1	–	INTEGRAL	V	54 403–55 984
TYC 7408 0054 1	1.075	0.005	0.150	0.033	EB	–	literature	V	–
HIP 92680	0.944	0.001	0.110	0.032	Bw	PZ Tel	literature	V	–
TYC 6872 1011 1	0.503	0.004	0.060	0.032	Bw	–	literature	–	–
J19102820-2319486	3.64	0.02	0.13	0.01	S	–	YCO	V	56 950–56 972
TYC 687801951	5.70	0.05	0.090	0.032	Bw	–	literature	V	–
J19233820-4606316	3.237	–	0.110	–	S	–	SW	V	53 860–54 574
J19243494-3442392	0.708	0.001	0.020	0.007	Bc?	–	ROAD	V	57 155–57 199
TYC 7443 1102 1	11.3	0.2	0.09	0.03	Tw	–	literature	V	–
J19560294-3207186AB	1.569	0.003	0.030	0.025	Tc	–	KKO	R	56 844–56 914
J20013718-3313139	12.7	0.2	0.13	0.01	Tw	–	literature	V	–
J20055640-3216591	8.368	0.005	0.130	0.015	S	V5663 Sgr	SW	V	53 860–54 614
HD 191089	0.488	0.005	–	–	S+D	–	literature	V	–
J20100002-2801410AB	0.470	0.005	0.040	0.011	Bc	–	SW	V	53 860–54 614
J20333759-2556521	0.710	0.001	0.05	0.10	S	–	SW	V	53 958–54 614
HIP 102141A	1.191	0.005	0.040	0.005	Bc	AT MicA	SW	V	53 860–53 953
HIP 102141B	0.781	0.002	0.020	0.005	Bc	AT MicB	SW	V	53 860–53 953
J20434114-2433534	1.610	0.010	0.03	0.04	Bc	–	SW	V	53 958–54 388
HIP 102409	4.86	0.02	0.10	0.03	S+D	AU Mic	SW	V	–
HIP 103311	0.356	0.004	0.06	0.02	Bc	–	literature	V	–
TYC 6349 0200 1	3.41	0.05	0.120	0.028	Bw	AZ Cap	literature	V	–
J21100535-1919573	3.71	0.02	0.29	0.01	S	–	CASLEO	R	56 904–56 952
J21103147-2710578	1.867	0.008	0.04	0.14	Bw	–	SW	V	53 862–54 614
J21103096-2710513	–	–	–	–	Bw	–	SW	V	53 862–54 614
HIP 105441	5.50	0.02	0.050	0.009	Bw	V390 Pav	KKO+CASLEO	R	56 904–56 992
TYC 9114 1267 1	20.5	1.0	0.015	0.010	Bw	–	KKO+CASLEO	R	56 904–56 992
TYC 9486 927 1	0.542	–	0.190	–	Bc	–	literature	V	–
J21374019+0137137AB	0.202	0.001	0.130	0.004	Bc	–	CASLEO	R	56 904–56 950
J21412662+2043107	0.899	0.001	0.03	0.03	Bc?	–	SW	V	53 129–54 410
TYC 2211 1309 1	1.109	0.001	0.080	0.034	Bc	–	literature	V	–
TYC 9340 0437 1	4.46	0.03	0.16	0.03	S	–	literature	V	–
HIP 112312	2.37	0.01	0.110	0.006	Bw	WW Psa	literature	V	–
TX Psa	1.080	0.005	0.030	0.006	Bw	TX Psa	literature	V	–
J22571130+3639451	1.220	0.020	0.04	0.01	S	–	SW	V	53 154–54 666
TYC 5832 0666 1	5.68	0.03	0.140	0.028	S	–	literature	V	–
J23500639+2659519	0.287	0.005	0.05	0.02	Bc?	–	MEarth	RG715	55 857–56 469
J23512227+2344207	3.208	0.004	0.060	0.003	S	–	MEarth	RG715	55 851–56 471

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Appendix A: Discussion of individual targets

For each target, we provide the code to identify its single/binary nature, according to the notation presented in Sect. 7, and the $V - K_s$ color and rotation period.

– *HIP 560*

S+D; $V - K_s = 0.91$ mag; $P = 0.224$ d

HIP 560 is a F3V single star (Torres et al. 2006; Pecaut & Mamajek 2013; Rodriguez & Zuckerman 2012). Its membership to the β Pictoris association was first suggested by Zuckerman et al. (2001) and, subsequently, confirmed by Torres et al. (2006), Lépine & Simon (2009), Schlieder et al. (2012), and Malo et al. (2013). The measured projected rotational velocities are $v \sin i$ = 155 km s^{-1} (Abt & Morrell 1995); $v \sin i$ = 170 km s^{-1} (Royer et al. 2002); $v \sin i$ = 155 km s^{-1} (de la Reza & Pinzón 2004); and $v \sin i$ = 170.7 km s^{-1} (Torres et al. 2006). Infrared excess was first measured by Rebull et al. (2008). Then, Patel et al. (2014) and Riviere-Marichalar et al. (2014) reported the discovery of a debris disk.

HIP 560 was observed by HIPPARCOS and also included in the ASAS survey (ASAS 000650-2306.5). Our periodogram analysis of the ASAS photometric time series revealed a photometric rotation period $P = 0.20 \pm 0.02$ d and an amplitude of the light curve of $\Delta V = 0.02$ mag. However the photometric precision, $\sigma = 0.036$ mag, is very poor. Our periodogram analysis of the HIPPARCOS photometric time series, with good photometric precision ($\sigma = 0.007$ mag) but very poor observation sampling, revealed two major peaks at $P = 0.14$ d and $P = 0.27$ d.

We observed HIP 560 at YSVP from October 1 to November 6, 2015 for a total of seven nights. We were able to collect 2951 frames in the I filter using 10 s integration and operating the telescope in defocused mode, owing to the brightness of the target. The target was observed up to ten consecutive hours during the nights with the longer observation sequence. The magnitudes were computed with respect to an ensemble comparison consisting of two nearby stars, HD 242 and CD-236. The differential magnitude time series was binned using a bin width of 15 min and then analyzed for the period search. The achieved photometric precision was $\sigma_I = 0.007$ mag. The LS periodogram found the most significant period $P = 0.224 \pm 0.005$ d. The CLEAN periodogram detected the same period P = 0.22 d (see Fig. A.1), also in agreement with the results based on the ASAS photometry, within the uncertainties. Taking all this into account, we assumed that $P = 0.224$ d is the stellar rotation period. The light curve amplitude is $\Delta I = 0.01$ mag. We derived a luminosity $L = 4.18 \pm 1.50\,L_\odot$, a radius $R = 1.42 \pm 0.40\,R_\odot$, and an inclination for the spin axis of the star of $i = 32 \pm 5°$, when the average projected rotational velocity is adopted.

– *2MASS J00172353-6645124*

S; $V - K_s = 4.647$ mag; $P = 6.644$ d

2MASS J00172353-6645124 is a M2.5V star (Riaz et al. 2006). Its membership to the β Pictoris association was first proposed by Riedel (2012), by Malo et al. (2013; 2014a,b), and, subsequently, confirmed by Riedel et al. (2014), who found no evidence of multiplicity. These latter authors noted, however, that the absolute magnitude is 0.4 mag above the isochrone best fitting the β Pictoris members. Riedel et al. (2014) measured a trigonometric distance d = 37.5 pc. Malo et al. (2014a) measured a projected rotational velocity $v \sin i$ = 6.3 km s^{-1}.

Photometric time series of this star are available in the ASAS (ASAS J001723-6645.1), INTEGRAL/OMC (ID 8846000060), and SuperWASP (1SWASPJ001723.46-664512.1) archives. Kiraga (2012) reported a rotation period $P = 6.645$ d derived from the ASAS photometric time series, which is also confirmed by our own analysis of the same ASAS data. We also found a similar rotation period (P = 6.644 ± 0.027 d) in the LS and CLEAN periodograms of the INTEGRAL/OMC time series with an amplitude of the light rotational modulation $\Delta V = 0.10$ mag (see Fig. A.3). A similar period $P = 6.61 \pm 0.02$ d is retrieved from the SuperWASP photometric time series with a light curve amplitude ΔV = 0.12 mag (see Fig. A.2).

We derived a luminosity $L = 0.074 \pm 0.020\,L_\odot$ and a radius $R = 0.78 \pm 0.026\,R_\odot$. From these values we inferred $\sin i = 1.06 \pm 0.1$, which is slightly larger than $\sin i = 1$, which corresponds to a star viewed equator-on. Taking the uncertainties into account, we consider the inclination of the rotation axis to be $i \simeq 90°$. The observed relatively large light curve amplitude $\Delta V = 0.12$ mag (inferred from the SuperWASP data) is consistent with this configuration, which maximizes the amplitude of the light rotational modulation.

– *TYC 1186 0706 1 (FK Psc)*

Bw; $V - K_s = 3.623$ mag; $P = 7.90$ d

TYC 1186 0706 1 consists of two components with a separation $\rho = 1.7''$ (~102 AU) and a flux ratio ~2 in the H band (Brandt et al. 2014). The primary component is a K7.5V star (Lépine & Simon 2009). On the basis of the magnitude difference between the two components, we estimate a ~M5 spectral type for the secondary component (using a 23 Myr isochrone from Siess et al. 2000). TYC 1186 0706 1 was proposed by Lépine & Simon (2009) as a highly probable member of the association. Membership is also supported by McCarthy & White (2012), who measured a Li equivalent width (EW) comparable with those of similar spectral type members. However, subsequent analysis by Malo et al. (2013, 2014a), who determined a projected rotational velocity $v \sin i = 4.5 \pm 1$ km s^{-1}, found a membership probability <90%. On the other hand, Brandt et al. (2014) did not consider TYC 1186 0706 1 to be reliably associated with the β Pictoris association. A rotation period $P = 7.9165$ d was first measured by Norton et al. (2007) using the first season of SuperWASP data. Similar rotation periods, P = 7.70 d and $P = 7.90$ d, were found by Messina et al. (2010, 2011) analyzing the ASAS time series and two SuperWASP seasons, respectively.

– *GJ 2006AB*

Bw; $(V - K_s)_A = 4.858$ mag; $P_A = 3.99$ d; $(V - K_s)_B$ = 5.044 mag; $P_B = 4.91$ d

GJ 2006AB is a visual wide binary consisting of M3.5V + M3.5V components. Jao et al. (2003) measured a separation $\rho = 17.87''$ (PA = 175.02°) corresponding to ~580 AU and a magnitude difference $\Delta V = 0.26$ mag. Moreover, they found

that the V-band magnitude difference ranged from ΔV = 0.17 mag to 0.39 mag, thus inferring that one component, at least, is a variable star. The WDS catalog (The Washington Double Star Catalog, Mason et al. 2001) also reported a separation ρ = 18.0″ (PA = 180°) and a magnitude difference ΔV = 0.29 mag at the epoch 1920. GJ 2006AB was proposed by Riedel et al. (2014) and Malo et al. (2013) as candidate member of the β Pictoris association. Its membership to the Tucana/Horologium association was investigated and then rejected by Kraus et al. (2014). Finally, Malo et al. (2014a) concluded that GJ 2006AB can be considered a bona fide member of the β Pictoris association. Kraus et al. (2014) measured a $v \sin i_{\rm A}$ = 5.5 ± 0.4 km s^{-1}, whereas Malo et al. (2014a) computed $v \sin i_{\rm A}$ = 6.2 ± 1.4 km s^{-1} and $v \sin i_{\rm B} < 4.2$ km s^{-1}.
Our analysis of the unresolved ASAS photometry (ASAS 002750-3233.1) yielded a rotation period P = 3.97 d. However, to obtain the rotation periods of both components we planned our own observations. We observed GJ 2006AB at CASLEO from September 3 to October 21, 2014 for a total of 12 nights, using the R filter. Differential magnitudes were obtained with respect to the nearby nonvariable star 2MASS 00281856-3233255. The components of GJ 2006 were resolved and we determined the rotation periods of the A component, $P_{\rm A}$ = 3.99 ± 0.05 d, (see Fig. A.4), in good agreement with the previous results based on the unresolved ASAS photometry, and of the B component, $P_{\rm B}$ = 4.91 ± 0.05 d (see Fig. A.5), with a confidence level >99%. The A component exhibited a light curve amplitude ΔR = 0.19 mag, whereas the component B has an amplitude of ΔR = 0.12 mag.
For the primary component, adopting an average $v \sin i$, we derived a luminosity $L_{\rm A}$ = 0.040 ± 0.01 $L_\odot$, a radius $R_{\rm A}$ = 0.61 ± 0.20 $R_\odot$, and an inclination $i_{\rm A}$ = 55 ± 7°. We derived $L_{\rm B}$ = 0.036 ± 0.010 $L_\odot$, a radius $R_{\rm B}$ = 0.60 ± 0.20 $R_\odot$ for the secondary component and an inclination $i_{\rm B} < 42 \pm 7°$.

– *2MASS J00323480+0729271AB (GJ 3039)*

Bc; $(V - K_{\rm s})_{\rm A}$ = 5.02 mag; $P_{\rm A}$ = 3.355 d; $(V - K_{\rm s})_{\rm B}$ = 5.68 mag; $P_{\rm B}$ = 0.925 d

2MASS J00323480+0729271AB is a visual close binary consisting of M4 dwarf and a companion of later spectral type with an angular separation ρ = 0.″79 (McCarthy et al. 2001) (∼30 AU). This system was found by Schlieder et al. (2012) to be likely member of the association. However, the membership has been recently rejected by Binks & Jeffries (2016).
It was photometrically monitored by the ASAS (ASAS 003235+0729.5) and NSVS (ID 9141792). A detailed investigation on the photometric variability of this system was carried out by Messina et al. (2016b) who collected high-precision, multi-band photometric time series at the MO and at ARIES from October to December 2014; this work provides more detailed information. Briefly, Messina et al. measured the rotation periods of the two components, and found that the brighter M4 component has a rotation period P = 3.355 d and the fainter period P = 0.925 d. They also detected, for the first time for this system, two flare events in the R filter in correspondence of the light curve phase of minimum. As discussed in Messina et al. (2016b), the rotation periods of GJ 3039A and B fit well into the distribution of either single stars or wide binaries of the β Pictoris association. Since the component A has an inclination $i_{\rm A} \simeq 90°$, the system may be seen edge on. In this case, the projected separation (∼30 AU) may be significantly smaller than the real separation, making this system a wide binary. In fact, the two components have rotation periods comparable to those measured in wide binaries. Moreover, Messina et al. (2016b) raised the suspect that GJ 3039B is not physically bounded to GJ 3039A but may still be a member of the β Pictoris association.

– *TYC 5853 1318 1*

S?; $V - K_{\rm s}$ = 4.158 mag; P = 7.26 d

TYC 5853 1318 1 is a M1V star (Riaz et al. 2006) proposed as likely member of the β Pictoris association by Kiss et al. (2011). However, they noted that its spatial location slightly differs from the location of the bona fide members. Malo et al. (2013) found a significant membership probability (∼85%) of the β Pictoris association, when the binary hypothesis is considered. However, the same membership probability was found of the Tucana/Horologium association (THA), when the star is supposed as single. Kraus et al. (2014) considered it a likely member of the older Tucana/Horologium association on the basis of its lithium content, which is smaller than in other bona fide members of the β Pictoris association. However, this star is inside the Li depletion gap (see, Messina et al. 2016c), a circumstance that would explain the lower Li content. Malo et al. (2014a) measured a projected rotational velocity $v \sin i$ = 11.5 ± 1.4 km s^{-1}, whereas Kraus et al. (2014) measured $v \sin i$ = 6.8 ± 0.6 km s^{-1}.
Messina et al. (2011) measured a rotation period P = 7.26 d derived from SuperWASP data. Our present analysis of ASAS data (ASAS 010712-1935.6) confirms the period P = 7.3 d, which is found in six out of eight seasons and in the complete time series from the LS periodogram. On the other hand, the CLEAN algorithm also detected the same period in two seasons and in the complete series. If we consider the membership of THA, and a statistical distance d = 52 ± 3 pc, we derive a luminosity L = 0.25 ± 0.06 $L_\odot$, a radius R = 1.25 ± 0.26 $R_\odot$, and an inclination $i \sim 90°$ for the spin axis of the star adopting $\langle v \sin i \rangle$ = 9.1 km s^{-1}. However, if we consider the membership of the β Pictoris association (i.e., supposing the binary hypothesis), and a kinematic distance d = 43 ± 4 pc, we derive a radius R = 1.00 ± 0.13 $R_\odot$ that gives $\sin i \sim 1.3$. To conciliate radius, rotation period, and $v \sin i$ to get $\sin i \sim 1$, we must invoke a significant radius inflation.
We note that TYC 5853 1318 1 is the only bona fide member in our catalog whose single/binary nature is not known yet.

– *2MASS J01112542+1526214 (GJ 3076)*

Bc; $(V - K_{\rm s})_{\rm A}$ = 6.252 mag; $P_{\rm A}$ = 0.9107 d; $(V - K_{\rm s})_{\rm B}$ = 6.552 mag; $P_{\rm B}$ = 0.7909 d

2MASS J01112542+1526214 is a visual close binary discovered by Beuzit et al. (2004) consisting of two components separated by ρ = 0.41″ (∼8 AU) with a K-band magnitude difference ΔK = 0.69 mag (and an estimated V magnitude difference ΔV = 1 mag) at a trigonometric distance d = 21.8 pc (Riedel et al. 2014). Reid et al. (1995) determined that the combined spectral classification for

this system is M5.0, whereas Janson et al. (2012) provided the classification M5V + M6V. The membership of the association was proposed by Malo et al. (2013) and confirmed by Riedel et al. (2014). Later, Malo et al. (2014b) concluded that it can be considered a bona fide member of the association. This system is also included by Elliott et al. (2016) in the list of β Pictoris members. Hosey et al. (2015) found evidence of long-term photometric variability with a possible cycle of about 5 yr. According to Delfosse et al. (1998), the projected rotational velocity is $v \sin i_{AB} = 15.2\,\mathrm{km\,s^{-1}}$. Malo et al. (2014a) measured a value of $v \sin i_{AB} = 17.9\,\mathrm{km\,s^{-1}}$ and a Li $EW_{AB} = 593$ mÅ.
This system was observed photometrically (but unresolved) as part of the MEarth project (Berta et al. 2012). Our LS and CLEAN analyses of the MEarth archival photometric time series allowed us to measure two highly significant (FAP < 0.01) photometric rotation periods. The most powerful is $P = 0.9107 \pm 0.001$ d that we attribute to the brighter component, and $P = 0.7909 \pm 0.001$ d, which is still observed after filtering out the primary period, that we attribute to the secondary fainter component (see Fig. A.6).

– *2MASS J01132817-3821024*

Tc; $V - K_s = 4.174$ mag; $P = 0.4456$ d

2MASS J01132817-3821024 is a triple system consisting of a M1 + M3 eclipsing binary system and a close M1 visual companion. The eclipsing binary is detached and was discovered within the ASAS survey (Pojmanski 2002). Parihar et al. (2009) classified its components as M1V + M3V and measured an orbital period $P = 0.4456$ d. The visual close companion was detected by Bergfors et al. (2010) at a distance $\rho = 1.415''$ (PA = 27.2°), with a magnitude difference $\Delta z' = \Delta i' = 0.17$ mag with respect to the eclipsing binary. Janson et al. (2012) derived the following parameters assuming the eclipsing binary as a unique component: $\mathrm{SpT_{AB}}$ = M0.5, $\mathrm{SpT_C}$ = M1.0, $M_{AB} = 0.56\,M_\odot$, $M_C = 0.54\,M_\odot$, and $\rho = 71.4$ AU, $P_{orb} = 812$ yr. The most extensive investigation was carried out by Hełminiak et al. (2012) who derived the physical/orbital parameters of the component A + B of the eclipsing binary, as well as hints of binarity for the component B, which is likely composed by two equal mass ($M \simeq 0.45$–$0.50\,M_\odot$) stars. Malo et al. (2013) measured an upper limit for the rotational velocity $v \sin i < 9\,\mathrm{km\,s^{-1}}$, and found that this system might be a member either of the β Pictoris (22%) or the Tucana/Horologium (59%), or the Columba (19%) associations.

– *2MASS J01351393-0712517*

SB2; $V - K_s = 5.502$ mag; $P = 0.7031$ d

2MASS J01351393-0712517 is a M4.5V SB2 spectroscopic binary (Malo et al. 2013). It was proposed by Shkolnik et al. (2012) as member of the β Pictoris association with membership quality AAB. Malo et al. (2013) found that this system might be also a member of the Columba association. They measured a projected rotational velocity $v \sin i = 55.1 \pm 4.8\,\mathrm{km\,s^{-1}}$. The membership of the β Pictoris association was confirmed by Binks & Jeffries (2014) who measured $v \sin i = 50.7 \pm 5.9\,\mathrm{km\,s^{-1}}$, and more recently by Binks & Jeffries (2016), and Elliott et al. (2016).
The stellar rotation period $P = 0.7031$ d was measured by Kiraga (2012), based on the ASAS time series.

– *2MASS J01365516-0647379*

Bw; $V - K_s = 5.138$ mag; $P = 0.3464$ d

This is a visual wide binary consisting of M4 dwarf and a stellar companion with spectral type later than L0 (Bergfors et al. 2010). The components have a separation $\rho = 5.587''$ (PA = 179.9°; ~134 AU), and a magnitude difference $\Delta z' = 5.07$ mag. The faint component was also detected by Bowler et al. (2015) with a slightly different separation $\rho = 6.662 \pm 0.003''$ and $\Delta K = 13.8$ mag. It is at a trigonometric distance $d = 24 \pm 0.4$ pc (van Leeuwen 2007). Shkolnik et al. (2012) proposed a membership (with quality match ABA) of the Pleiades cluster, whereas Malo et al. (2013, 2014b) found a high probability that this M4 star is a member of the β Pictoris association. Malo et al. (2014a) also measured a projected rotational velocity $v \sin i = 10\,\mathrm{km\,s^{-1}}$ and inferred $T_{\rm eff} = 3500$ K, which they noticed to be too high for its M4 spectral type. On the other hand, Malo et al. did not detect any Li line, noticing that it is detectable in similar $T_{\rm eff}$ members. This system is found by Elliott et al. (2016) to have the star 2MASS J01373545-0645375 as common proper motion companion at a separation of 14635 AU. Interestingly, this system has been identified by Alonso-Floriano et al. (2011) as the wide proper-motion companion ($\rho = 612''$) of EX Cet, which is a BY Dra-type star in the Her-Lyr moving group with an age of about 200 Myr at the same distance $d = 24$ pc. Gaidos et al. (2000) measured Li $EW = 88.7 \pm 2.3$ mÅ and $v \sin i = 2.9\,\mathrm{km\,s^{-1}}$ for EX Cet.
We observed this target at CASLEO in September–October 2014 for a total of eight nights in the R filter and at HAO in November 2014 for a total of ten nights in the V filter. Differential magnitudes were obtained with respect to an ensemble of seven nearby nonvariable stars. The two time series were combined, first by adding to the R data a magnitude offset such that their mean magnitude was equal to the V mean magnitude, and subsequently, by tuning that magnitude offset by minimizing the dispersion in the phased light curve between V and R magnitudes. We measured a rotation period $P = 0.3464 \pm 0.0005$ d with high confidence level (FAP < 0.01) with both LS and CLEAN periodograms. The light curve exhibits an amplitude $\Delta V = 0.11$ mag (see Fig. A.7). We inferred from our own photometry magnitudes $V = 14.00 \pm 0.05$ mag and $R = 13.32 \pm 0.05$ mag. We derived for the primary component a luminosity $L = 0.010 \pm 0.003\,L_\odot$, a radius $R = 0.32 \pm 0.10\,R_\odot$, and an inclination $i \sim 12 \pm 2°$.

– *TYC 1208 0468 1*

Bw; $V - K_s = 3.114$ mag; $P = 2.803$ d

TYC 1208 0468 1 is a wide visual binary consisting of K3V + K5V components (Malo et al. 2014b) separated by $\rho = 1.73''$ (Morlet et al. 2000) (~100 AU) at a trigonometric distance $d = 60$ pc. The membership of the β Pictoris association was suggested by Schlieder et al. (2010) and later by Bell et al. (2015); whereas Malo et al. (2014a) indicated a possible membership of the Columba association. The projected rotational velocity is $v \sin i = 16.6\,\mathrm{km\,s^{-1}}$ (Malo et al. 2014a).

A photometric rotation period $P = 2.803$ d and an amplitude of the light curve $\Delta V = 0.073$ mag were measured by Kiraga (2012) based on ASAS photometry.

– *2MASS J01535076-1459503*

Bc; $V - K_s = 4.897$ mag; $P = 1.515$ d

2MASS J01535076-1459503 is a visual binary consisting of two M3V + M3V components with an angular separation $\rho = 2.876''$ (PA = 291.9°; ~80 AU), magnitude differences $\Delta z' = 0.01$ mag, $\Delta i' = 0.13$ mag, and at a trigonometric distance $d = 18$ pc (Bergfors et al. 2010). It was proposed by Malo et al. (2014a) as candidate member of the β Pictoris association, who measured a projected rotational velocity $v \sin i < 11.2$ km s^{-1}.
Kiraga (2012) determined a rotation period $P = 1.515$ d from the ASAS photometric time series.

– *2MASS J02014677+0117161 and RBS 269*

Bw; $(V - K_s)_S = 4.515$ mag; $(V - K_s)_N = 4.462$ mag; $P =$ 5.98 d and $P = 3.30$ d

2MASS J02014677+0117161 (southern component) and RBS 269 (northern component) form a visual binary consisting of two M dwarfs with a separation $\rho = 10.48''$ (~670 AU) and a position angle PA = 167° at a distance $d = 63.70$ pc (Alonso-Floriano et al. 2015). This system is associated with the X-ray source RX J0201.7+0117 (Haakonsen & Rutledge 2009). These stars are listed by Schlieder et al. (2012), Binks & Jeffries (2014), and Malo et al. (2014a,b) among the members of the β Pictoris association.
Kiraga (2012) measured a photometric period $P = 6.006$ d and an amplitude for the rotational modulation $\Delta V =$ 0.086 mag derived from unresolved ASAS time series. We have re-analyzed the ASAS data and found two significant power peaks in both LS and CLEAN periodograms at $P =$ 6.00 d and $P = 3.41$ d. We retrieved another photometric time series from the INTEGRAL/OMC archive (ID 0037000047). The LS and CLEAN periodograms found a rotation period $P = 5.87 \pm 0.22$ d (see Fig. A.8) in agreement, within the uncertainties, with the longer period derived from ASAS data. This system was also observed by NSVS (ID 12053205). Our analysis considering these data revealed the periods $P = 3.30 \pm 0.01$ d and $P = 5.98 \pm 0.02$ d (see Fig. A.9). These two values likely represent the rotation periods of the two components, although we are not capable to establish of which component they are.

– *2MASS J02175601+1225266*

S; $V - K_s = 4.537$ mag; $P = 1.995$ d

Riaz et al. (2006) inferred a M3.5V spectral type for this object from TiO-band strength at a spectroscopic distance $d = 43$ pc. They associated this star with the X-ray source 1RXS J021756.5+122532, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -2.89$. Schlieder et al. (2012) listed it among the β Pictoris candidate members. Its membership was subsequently confirmed by Binks & Jeffries (2014, 2016) who also inferred a kinematic distance $d = 67.9 \pm 6$ pc, assuming the β Pictoris membership, and measured $v \sin i = 22.6 \pm 3.0$ km s^{-1}. No nearby visual companion was found by the AstraLux Large M-dwarf Survey (Janson et al. 2012). Two RV measurements are available RV = $+7.0 \pm 1.4$ km s^{-1} from Binks & Jeffries (2014) and RV = $+8.0 \pm 0.3$ km s^{-1} from Malo et al. (in prep.), who also measured $v \sin i = 17$ km s^{-1} and detected no sign of binarity in their ESPaDOnS@CFHT spectrum.
We carried out multi-band photometric observations of this target at ARIES in October and December 2014 for a total of five nights. Differential magnitudes were obtained with respect to the nearby nonvariable star 2MASS 02173354+1228171. The LS and CLEAN analyses revealed a rotation period $P = 1.995 \pm 0.005$ d in all filters with FAP = 1%. We observed this star at the phases of maximum and minimum light, but were unable to cover the other rotation phases (see Fig. A.10). Moreover, we retrieved a photometric time series for this target from the CSS (MLS_J021756.0+122526) totaling 67 measurements from 2006 to late 2013. Despite the low photometric precision of this data ($\sigma_V = 0.05$ mag), our LS analysis revealed a significant (FAP < 1%) power peak at $P = 2.14 \pm 0.05$ d (see Fig. A.11), in agreement with the rotation period independently derived from our own observations.
We derive a luminosity $L = 0.12 \pm 0.01\, L_\odot$, a radius $R =$ $1.16 \pm 0.12\, R_\odot$, and an inclination $i = 55°$.

– *HIP 10680/HIP 10679 (= HD 14082AB)*

Bw+D; $(V - K_s)_A = 1.163$ mag; $P_A = 0.2396$ d; $(V - K_s)_B =$ 1.488 mag; $P_B = 0.777$ d

This is a visual binary consisting of F5V + G2V components with an angular separation $\rho \sim 13.8''$ (Mason et al. 2001) and a distance $d = 37.62$ pc (Pecaut & Mamajek 2013); (~520 AU). The cooler component hosts a debris disk (Rebull et al. 2008). The membership of the β Pictoris association was first proposed by Barrado y Navascués et al. (1999) and then by Song et al. (2003) and Zuckerman & Song (2004). Then, its membership was recovered by Makarov (2007), Torres et al. (2008), Lépine & Simon (2009), and by McCarthy & White (2012) on the basis of Li EW. This system was searched by SEEDS (Strategic Exploration of Exoplanets and Disks with Subaru), but no companion candidates were detected within a projected separation of 7.5″ (~210 AU) from each component (Brandt et al. 2014). We retrieved one spectrum for each component in the 3800−9000 Å region from the LAMOST archive. From our analysis, we inferred a F2V spectral type for HIP 10680, measured a Li $EW =$ 254 ± 7 mÅ, and detected the Hα line in absorption with $EW = 3.81 \pm 0.23$ Å. We inferred a G3V spectral type, measured a Li $EW = 341 \pm 8$ mÅ, and detected the Hα line in absorption with $EW = 3.46 \pm 0.33$ Å for HIP 10679.
HIP 10680 and HIP 10679 have projected equatorial velocities $v \sin i = 37.6$ km s^{-1} and $v \sin i = 7.8$ km s^{-1}, respectively (Valenti & Fischer 2005). HIP 10680 is reported in the HIPPARCOS catalog as a likely algol-type eclipsing binary with a period $P = 7.06$ d. However, a note in the catalog reports the possibility that this photometry has been contaminated at some epochs by the presence of the close companion generating a spurious variability.
The most recent photometric investigation was carried out by Messina et al. (2015a) and provides a more detailed information. Briefly, we collected a photometric time series at the

Taurus Hill Observatory from October 2014 to January 2015. We measured the rotation periods of both components. The rotation period of HIP 10680 is $P = 0.2396$ d whereas the rotation period of HIP 10679 is $P = 0.777$ d. For HIP 10680, we derived a luminosity $L = 1.88 \pm 0.17\,L_{\odot}$ and a radius $R = 1.11 \pm 0.10\,R_{\odot}$. Combining radius and projected stellar velocity, we estimated an inclination for the stellar rotation axis $i = 10°$. We derived a luminosity $L = 0.96 \pm 0.09\,L_{\odot}$ and a radius $R = 0.95 \pm 0.09\,R_{\odot}$ for HIP 10679. Combining radius and projected rotational velocity, we found the same inclination for the stellar rotation axis $i = 10°$.

– *HIP 11152*

S; $V - K_{\rm s} = 3.74$ mag; $P = 3.6/1.8$ d

HIP 11152 is a M3V star studied by Schlieder et al. (2010) who proposed its membership to the β Pictoris association and measured a projected rotational velocity $v \sin i = 6 \pm 2$ km s^{-1}. McCarthy & White (2012) and Malo et al. (2013, 2014b) considered it a bona fide member.
Our LS and CLEAN analyses of the SuperWASP photometric time series allowed us to infer a rotation period $P = 1.80 \pm 0.01$ d and a light curve amplitude of $\Delta V = 0.06$ mag (see Fig. A.12). We derived a luminosity $L = 0.073 \pm 0.020\,L_{\odot}$, radius $R = 0.59 \pm 0.19\,R_{\odot}$, and an inclination $i = 21 \pm 7°$. Such highly inclined stars generally exhibit low-amplitude light curves that are smaller than the observed light curve (see, e.g., Messina et al., Paper III). Therefore, we suspect that this star may have two major spot groups on opposite hemispheres that modulate the stellar flux with half the rotation period. Therefore, the correct rotation period would be $P = 3.6$ d, which is twice as long as that detected by the periodogram (to which corresponds an inclination $i \sim 45 \pm 7°$).

– *HIP 11437AB (AG Tri)*

Bw+D; $(V - K_{\rm s})_{\rm A} = 3.040$ mag; $P_{\rm A} = 12.5$ d; $(V - K_{\rm s})_{\rm B} = 4.219$ mag; $P_{\rm B} = 4.66$ d

HIP 11437AB is a wide visual binary consisting of K4V + M1V components (Messina et al. 2015c) at a distance $d = 42.3$ pc (Rodriguez & Zuckerman 2012). The components have an angular separation $\rho = 22''$ (~930 AU) (Mason et al. 2001). This system was first proposed as a member of the β Pictoris association by Song et al. (2003) and Zuckerman & Song (2004). This membership was subsequently confirmed by Makarov (2007), Torres et al. (2006), and Lépine & Simon (2009). The measured projected rotational velocities for this system are $v \sin i_{\rm A} = 5$ km s^{-1} (Cutispoto et al. 2000); $v \sin i_{\rm A} = 4.7$ km s^{-1} and $v \sin i_{\rm B} = 5$ km s^{-1} (Bailey et al. 2012), and more recently, $v \sin i_{\rm A} = 5.25 \pm 0.75$ km s^{-1} and $v \sin i_{\rm B} = 7.46 \pm 0.75$ km s^{-1} (Messina et al. 2015c). High-contrast *H*-band imaging with the Subaru telescope by Brandt et al. (2014) did not detect any companion candidates within $7''$ (~300 AU projected) from both components. The presence of a debris disk around the A component was first detected by Rebull et al. (2008) using MIPS observations, and recently by Riviere-Marichalar et al. (2014) from *Hershell* observations. We retrieved from the LAMOST archive a spectrum of HIP 11437A in the 3800−9000 Å region. We detected the Hα line in emission and measured an $EW = -0.57 \pm 0.01$ Å. A rotation period $P = 13.6828$ d was first measured by Norton et al. (2007), and subsequently confirmed by Messina et al. (2011), who reported $P = 12.5$ d. The most recent photometric study of AG Tri was carried out by Messina et al. (2015c), who measured for the first time a rotation period $P = 4.66$ d for the component B; that paper provides more detailed information on this object.
We derived a luminosity $L_{\rm A} = 0.27 \pm 0.03\,L_{\odot}$, a radius $R_{\rm A} = 1.02 \pm 0.12\,R_{\odot}$, and an inclination $\sin i_{\rm A} \sim 1.3$ for the primary (see Messina et al. 2015c). We derived $L_{\rm B} = 0.063 \pm 0.005\,L_{\odot}$, a radius $R_{\rm B} = 0.68 \pm 0.09\,R_{\odot}$, and an inclination $i_{\rm B} \simeq 80 \pm 9°$ for the secondary component.

– *HIP 12545*

S; $V - K_{\rm s} = 3.301$ mag; $P = 4.83$ d

HIP 12545 is classified as K6Ve by Torres et al. (2006). Torres et al. (2008) reported the detection of RV variations and suggested that this star might be a SB1 binary with the K6Ve as primary component. However, this claim was not confirmed by Bailey et al. (2012) who did not find any significant RV variation. Images from SEEDS did not detect any companion candidate within 8.5″ (Brandt et al. 2014). Its membership to the β Pictoris association was first proposed by Song et al. (2003) and Zuckerman & Song (2004). Its membership was also recovered by Torres et al. (2008) and Schlieder et al. (2012). Malo et al. (2014b) listed this star among the bona fide members of the association. The membership was only questioned by Elliott et al. (2014) on the basis on new RV measurements. In the literature we found the following values of the rotational velocity: $v \sin i < 8$ km s^{-1} (Favata et al. 1995); $v \sin i = 9.3$ km s^{-1} (Scholz et al. 2007); $v \sin i = 9$ km s^{-1} (da Silva et al. 2009); $v \sin i = 9$ km s^{-1} (Weise et al. 2010); and $v \sin i = 8.7 \pm 0.2$ km s^{-1} (Bailey et al. 2012). The only discrepant $v \sin i = 40$ km s^{-1} value is reported by Torres et al. (2006), which is probably unreliable.
A rotation period $P = 4.831$ d and a light curve amplitude $\Delta V = 0.105$ mag were measured by Kiraga (2012). We derived a luminosity $L = 0.27 \pm 0.02\,L_{\odot}$ and a radius $R = 0.92 \pm 0.25\,R_{\odot}$. Our LS and CLEAN analyses revealed the existence of two peaks in almost all seasons of ASAS: the dominant is at $P = 4.83$ d, but also a second peak is almost always present with comparable power at $P = 1.26$ d, which is however its 1-d beat period. We observed HIP 12545 at CrAO between 25 October and 24 December 2015 for a total of 11 nights in the *B*, *V*, *R*, and *I* filters. We collected a total of 71 frames per filter. Differential magnitudes were obtained with respect to the nearby nonvariable star 2MASS 02410935+0557497. Our LS and CLEAN analyses revealed the highest peak at $P = 4.85 \pm 0.01$ d and a light curve amplitude $\Delta V = 0.14$ mag (see Fig. A.13). In contrast to what was stated by Messina et al. (2011), $P = 4.85$ d is the stellar rotation period that combined with the average $\langle v \sin i \rangle = 9$ km s^{-1} and the stellar radius, yields an inclination of the stellar rotation axis $i = 70 \pm 10°$.

– *2MASS J03350208+2342356*

Bc?; $V - K_{\rm s} = 5.739$ mag; $P = 0.4719$ d

2MASS J03350208+2342356 is classified as a M8.5 star by Gizis et al. (2000). This star was proposed by Shkolnik et al. (2012) as a member of the β Pictoris association with quality BAA. Malo et al. (2013, 2014b) considered this star a bona fide member. Close et al. (2003) did not found any physical companion within 0.1–15″ from high-resolution imaging. However, no RV study was carried out to confirm its single nature. Reid et al. (2002) classified it as a likely brown dwarf with $M = 0.06\,M_{\odot}$ and 1 Gyr of age, finding clear evidence of the presence of a Li line ($\mathrm{Li_{EW}} = 720$ mÅ), a significant level of chromospheric activity ($EW_{\mathrm{H}\alpha} = -6.5$ Å), rapid rotation ($v\sin i = 30$ km s^{-1}), and a distance $d = 23.5$ pc from photometric parallax. Ribas (2003) found its space velocities to be similar to the average of the Castor Moving Group with an age of about 320 Myr. We retrieved from the LAMOST archive a spectrum in the 3800–9000 Å region. From our analysis, we detected the Hα line in emission and measured an $EW = -2.42 \pm 0.21$ Å.

We retrieved a photometric time series from the NSVS archive and our LS analysis revealed a rotation period $P = 0.475 \pm 0.005$ d with a light curve amplitude of $\Delta V = 0.14$ mag, and an average photometric precision $\sigma = 0.14$ mag (see Fig. A.14). In contrast, the CLEAN periodogram showed the most significant power peak at $P = 0.66$ d. We also retrieved a photometric time series from CSS. From these data our LS and CLEAN analyses revealed a rotation period $P = 0.4719 \pm 0.005$ d with a light curve amplitude of $\Delta V = 0.03$ mag, and an average photometric precision $\sigma = 0.06$ mag (see Fig. A.15). Combining rotation period $P = 0.4719$ d, $v\sin i$, and stellar radius, which we estimated to be about $R = 0.12 \pm 0.04\,R_{\odot}$, we inferred $\sin i > 1$. This unreliable value may arise from the underestimation of either the radius or the distance.

– *2MASS J03461399+1709176*

S; $V - K_{\mathrm{s}} = 4.079$ mag; $P = 1.742$ d

2MASS J03461399+1709176 is a single M0.5 star (Janson et al. 2012) at a distance $d = 64$ pc. It is listed by Schlieder et al. (2012) as a high-probability candidate member of the β Pictoris association at a kinematic distance $d = 58.4$ pc. This star was observed by HATNet (HAT 308-0001461). From this data, a rotation period $P = 1.742$ d was reported by Hartman et al. (2010) with an amplitude for the flux rotational modulation $\Delta r = 0.068$ mag. This star has a visual companion StKM 1-406a ($V - K_{\mathrm{s}} = 3.14$ mag) at a separation $\rho = 8''$ (14″ as maximum observed separation; Mason et al. 2001) with rotation period $P = 0.897$ d (Hartman et al. 2010).

– *GJ 3305*

Bc; $V - K_{\mathrm{s}} = 4.177$ mag; $P = 4.89$ d

This is a visual close binary consisting of a M1 primary component and a secondary component of spectral type later than M1 with a separation of $\rho = 0.093''$ (∼9 AU; Kasper et al. 2007). Based on 12 epochs of astrometric observations (where the observed separation ranges from 0.095″ to 0.307″), Janson et al. (2014) estimated an orbital period of 30 yr. The membership of the β Pictoris association was first proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), then by Torres et al. (2008) and confirmed by Binks & Jeffries (2014, 2016), and by Elliott et al. (2016). Scholz et al. (2007) measured a projected rotational velocity $v\sin i = 5.3$ km s^{-1}. Montet et al. (2015) and Elliott et al. (2016) identified the F0V star 51 Eri at a separation $\rho = 66''$ (∼1940 AU) as a likely wide companion of this system.

The only available rotation period in the literature is $P = 6.1$ d, which was tentatively adopted by Feigelson et al. (2006) and inferred from photometric data collected at the Southern African Astronomical Observatory. We analyzed the ASAS time series obtained by using the smallest aperture to minimize any flux contribution from the nearby F0V companion. The LS and CLEAN periodograms revealed the most significant peak at $P = 4.89 \pm 0.01$ d with a light curve peak-to-peak amplitude $\Delta V = 0.05$ mag. However, we still consider this measurement to be confirmed.

– *2MASS J04435686+3723033 (V 962 Per)*

Bw; $V - K_{\mathrm{s}} = 4.179$ mag; $P = 4.2878$ d

2MASS J04435686+3723033 is a M3V star proposed by Schlieder et al. (2010) and Malo et al. (2014ab,) as a likely member of the β Pictoris association together with its nearby proper-motion companion PM I04439+3723E, which is located at a distance $\rho = 9''$ (∼531 AU). Pecaut & Mamajek (2013) listed it among the bona fide members of the association. Two projected rotational velocity measurements are available: $v\sin i = 8 \pm 2$ km s^{-1} by Schlieder et al. (2010) and $v\sin i = 10.6 \pm 1$ km s^{-1} (Malo et al. 2014a). We retrieved from the LAMOST archive one spectrum in the 3800–9000 Å region. From our analysis we inferred a M2V spectral type and found the Hα line in emission with $EW = -4.60 \pm 0.21$ Å.

A rotation period $P = 4.2878$ d was measured by Norton et al. (2007) from SuperWASP data. We derived a luminosity $L = 0.73 \pm 0.02\,L_{\odot}$ and a radius $R = 0.68 \pm 0.22\,R_{\odot}$. Combining radius and the projected rotational velocity $v\sin i = 8$ km s^{-1}, we estimated an inclination for the stellar rotation axis $i = 90 \pm 15°$.

– *HIP 23200 (V1005 Ori)*

SB1; $V - K_{\mathrm{s}} = 3.99$ mag; $P = 4.43$ d

HIP 23200 is classified as a M0.5e by Torres et al. (2006). Elliott et al. (2014), collecting literature RV measurements, noted significant radial velocity variation and inferred that it is a SB1 system. Elliott et al. (2016) inferred the masses $0.7\,M_{\odot}$ for the primary and $0.3\,M_{\odot}$ for the secondary, and a separation of 0.26 AU between the two components. This system is found to have as common proper motion the star 2MASS J05015665+0108429 with a separation of 81044 AU, and therefore is classified as a hierarchical triple system (Elliott et al. 2016). Biller et al. (2013) detected two nearby stars at 4.8″ and 7.2″ that were classified as background stars. The membership was first proposed by Torres et al. (2008), confirmed by Lépine & Simon (2009), and recovered by Schlieder et al. (2012).

The determination of the stellar rotation period was very

challenging. We have four different values for the rotational projected velocity: an upper value $v \sin i < 3\,\mathrm{km\,s^{-1}}$ by Reiners et al. (2012); $v \sin i = 14\,\mathrm{km\,s^{-1}}$ by Favata et al. (1995); $v \sin i = 8.7\,\mathrm{km\,s^{-1}}$ by Vogt et al. (1983), and $v \sin i = 14\,\mathrm{km\,s^{-1}}$ by Torres et al. (2006). These values span a range too large to allow us to constrain the rotation period. The first rotation period determination was carried out by Bopp & Espenak (1977) who reported a period $P = 1.96$ d, cautioning that it could be alias of the true period. The equally probable periods $P = 1.858$ d and $P = 2.20$ d were later found by Bopp et al. (1978). Byrne et al. (1984) reported a period $P = 4.565$ d. Later, Amado et al. (2001) reported a period $P = 4.399$ d detected in two consecutive years at the South African Astronomical Observatory. The most recent period determination $P = 4.4236$ d is reported by Dal & Evren (2011) and it was obtained in two consecutive years.
Our LS and CLEAN analyses of ASAS time series show the following periods in all seasons (as well as in the complete series) in order of decreasing power: $P = 4.42$ d, $P = 1.29$ d, $P = 2.2$ d, and $P = 1.83$ d (see Fig. A.16). They all give smooth phased light curves. However, when we combine the ASAS and the contemporary 2005–2006 Dal & Evren photometry, which allows us to obtain a better sampled time series, the power peak at $P = 4.40$ d becomes the dominant showing it to be the true rotation period. Similar periods, both based on the ASAS data, $P = 4.414$ d and $P = 4.390$ d, are measured by Kiraga (2012) and in the ASAS Catalog of Variable Stars, respectively. On the other hand, at some epochs this star may have two major spots on opposite hemispheres that modulate the light curve with a period that is a half (2.2 d) the true rotation period (4.4 d). This spot configuration would explain the detection of the $P = 2.2$ d by us and by Bopp et al. (1978).
Considering that this is a binary system, we cannot discard that the other detected periodicities, either $P = 1.86$ d or $P = 2.2$ d, are the rotation period of the secondary component.

– *HIP 23309*

S; $V - K_s = 3.756$ mag; $P = 8.60$ d

HIP 23309 is classified as M0Ve by Torres et al. (2006), whereas Pecaut & Mamajek (2013) indicate a slightly earlier K8V spectral type. We consider this star to be single because neither Torres et al. (2006) nor Elliott et al. (2014) find evidence for significant RV variations. Its membership was first proposed by Zuckerman et al. (2001), later by Zuckerman & Song (2004), and subsequently confirmed in many other studies (e.g., Neuhäuser et al. 2003; Jayawardhana et al. 2006; Torres et al. 2006; Mentuch et al. 2008; Lépine & Simon 2009). The available measurements of rotational velocity are $v \sin i = 5.8\,\mathrm{km\,s^{-1}}$ (Weise et al. 2010); $v \sin i = 6\,\mathrm{km\,s^{-1}}$ (da Silva et al. 2009); $v \sin i = 5.77\,\mathrm{km\,s^{-1}}$ (Scholz et al. 2007); and a discrepant value of $v \sin i = 11\,\mathrm{km\,s^{-1}}$ (de la Reza & Pinzón 2004).
Our LS and CLEAN periodogram analyses of ASAS time series find in all seasons (as well as in the complete series) the same rotation period, $P = 8.6$ d, and a light curve amplitude up to $\Delta V = 0.07$ mag (see Fig. A.17). A similar period $P = 8.729$ d is reported by Kiraga (2012). We derived a luminosity $L = 0.17 \pm 0.04\,L_\odot$ and a radius $R = 0.90 \pm 0.29\,R_\odot$. Combining radius and the average projected stellar velocity $\langle v \sin i \rangle = 5.8\,\mathrm{km\,s^{-1}}$, we estimated $\sin i = 1.1 \pm 0.15$.

– *TYC 1281 1672 1*

S; $V - K_s = 3.153$ mag; $P = 2.759$ d

TYC 1281 1672 1 is a K2IV star (White et al. 2007). It is listed by Schlieder et al. (2012) among the candidate members of the β Pictoris association at a kinematic distance $d = 53.8$ pc. White et al. (2007) measured a projected rotational velocity $v \sin i = 17.22 \pm 5.0\,\mathrm{km\,s^{-1}}$.
Kiraga (2012) measured a rotation period $P = 2.763$ d and an amplitude for the rotational flux modulation $\Delta V = 0.08$ mag. We retrieved a magnitude time series from the INTEGRAL/OMC archive (ID 1281000037). The LS periodogram revealed the same rotation period $P = 2.759 \pm 0.005$ d with an amplitude $\Delta V = 0.12$ mag, whereas the CLEAN periodogram showed its harmonic $P = 1.38$ d to be the dominant periodicity (see Fig. A.18). This circumstance may be explained with the present of two spot groups on opposite hemispheres. We derived a luminosity $L = 0.24 \pm 0.06\,L_\odot$ and a radius $R = 0.89 \pm 0.29\,R_\odot$. Combining radius and the projected rotational velocity, we find $\sin i = 1.05 \pm 0.10$. Taking the uncertainties into account, this star is likely seen equator on.

– *2MASS J05015665+0108429*

S?; $V - K_s = 5.523$ mag; $P = 2.08$ d

2MASS J05015665+0108429 is classified by Schlieder et al. (2012) as a M4 dwarf with a projected rotational velocity $v \sin i = 8 \pm 2\,\mathrm{km\,s^{-1}}$. We have no multiple RV measurements to establish its single/binary nature. The membership has been first proposed by Schlieder et al. (2012), recently rejected by Binks & Jeffries (2016), and later recovered by Elliott et al. (2016), who found this star to be a common proper motion companion of the bona fide member HIP 23200 at a distance of 81044 AU.
It was observed by ASAS and NSVS, however our periodogram analysis could not find any significant periodicity. A first attempt to measure the photometric rotation period was carried out by us in 2012 and 2015 using the facilities at the Xinglong station. We observed it for seven nights collecting a total of 34 frames in the V filter during the first run, and for ten nights during the second run collecting a total of 44 frames. Our LS and CLEAN periodograms revealed a photometric rotation period $P = 2.08$ d and a light curve amplitude $\Delta V = 0.06$ mag (see Fig. A.19). Subsequently, we retrieved a much longer photometric time series from the INTEGRAL/OMC archive (ID 0098000028). The LS and CLEAN periodograms confirmed the rotation period to be $P = 2.08 \pm 0.02$ d (see Fig. A.20) and we also detected a number of flare events.

– *HIP 23418*

Tc; $(V - K_s)_A = 4.780$ mag; $P = 1.22$ d

HIP 23418 is a triple system. The primary A component is a SB2 binary with spectral type M3, an orbital period $P_{orb} = 11.96$ d, and eccentricity $e = 0.323$. The secondary B component has a spectral type later than M3, an angular separation from the primary component of $\rho = 0.677''$ measured by HIPPARCOS (ESA 1997). Subsequently, Delfosse et al. (1998) determined $\rho = 0.97''$ with a magnitude difference

ΔK = 0.9 mag. Scholz et al. (2007) measured the following rotational velocities: $v\sin i_A$ = 7.67 km s^{-1} and $v\sin i_B$ = 21 km s^{-1}, whereas Shulyak et al. (2011) measured $v\sin i_A$ = 6.65 km s^{-1} and $v\sin i_B$ = 23.77 km s^{-1}. Riedel et al. (2014) measured a trigonometric distance $d = 24.6 \pm 1.3$ pc and inferred the following deblended magnitudes and colors V_{AC} = 12.46 mag and $(V-I)_{AC}$ = 2.71 mag, V_B = 13.56 mag, and $(V-I)_B$ = 3.15 mag. The membership of the β Pictoris association was first proposed by Song et al. (2003), Zuckerman & Song (2004), and then by Torres et al. (2006) and Lépine & Simon (2009). The membership was recently confirmed by Binks & Jeffries (2014, 2016), Riedel et al. (2014), and Elliott et al. (2016).

Our LS and CLEAN analyses of ASAS time series revealed two possible rotation periods: P = 6.43 d and P = 1.22 d (see Fig. A.21). We note that one period is the beat of the other. Kiraga (2012) measured a similar period, P = 6.431 d. Applying a correction of ΔV = 0.44 mag, to take care of the duplicity of the unresolved AC components, we derived $L_A = 0.019 \pm 0.002\,L_\odot$ and a radius $R_A = 0.41 \pm 0.06\,R_\odot$. Combining radius and the average projected stellar velocity, $\langle v\sin i\rangle$ = 7 km s^{-1}, we found that the rotation period must be shorter than about three days. Therefore, we inferred that the stellar rotation period is P = 1.22 d and the other is its beat period. This is a system where the rotation/orbital periods of the SB2 HIP 23418A components are not synchronized, yet. The faintness of the component B, and the photometric precision σ = 0.032 mag, did not allow us to detect its rotation period. Combining rotation period, radius, and $v\sin i$, we infer a very low inclination of the rotation axis i = 10° for the A component.

– *BD -21 1074AB*

Tw; $(V-K_s)_A$ = 4.350 mag; P_A = 9.3 d; $(V-K_s)_B$ = 4.640 mag; P_B =5.4 d

BD −21 1074 is a triple system consisting of a M1.5V star (A) at 8.2″ from the secondary a M2.5V star (B) that has a nearby companion at 0.8″ (∼21 AU) of M5 or later spectral type (Torres et al. 2008). It is listed in the Gershberg et al. (1999) catalog of the UV Cet-type flare stars.

The most recent photometric and spectroscopic investigation of this system was carried out by Messina et al. (2014) who reported periods P = 9.3 d and P = 5.4 d for the primary and secondary components, respectively. That paper provides more detailed information on this system. The rotation periods, combined with their measurements of projected rotational velocities, $v\sin i_A = 3.7 \pm 1$ km s^{-1} and $v\sin i_B = 4.9 \pm 1$ km s^{-1}, and the stellar radii $R_A = 0.80\,R_\odot$ and $R_B = 0.68\,R_\odot$ yield inclination values i_A = 60° and i_B = 50°.

– *2MASS J05082729-2101444*

S; $V-K_s$ = 5.867 mag; P = 0.2804 d

2MASS J05082729-2101444 is classified as M5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 26 pc. They associate this star with the X-ray source 1RXS J050827.3–210130, which exhibits strong X-ray to bolometric luminosity L_X/L_{bol} = −3.19. Bergfors et al. (2010) observed this target in 2008.88 with the Lucky Imaging camera AstraLux Sur but did not discover any close companion. There are two RV measurements (Malo et al. 2014a) that agree within their errors suggesting it is a single star. Malo et al. (2013, 2014b) proposed it as member of the β Pictoris association and its membership was confirmed by Binks & Jeffries (2014, 2016) who inferred a kinematic distance d = 30 pc against the statistical distance, d = 25 pc, from Malo et al. (2014b).

We analyzed the SuperWASP magnitude time series with LS and CLEAN periodograms and found a rotation period $P = 0.2804 \pm 0.0005$ d with FAP < 1% and a peak to-peak light curve amplitude ΔV = 0.07 mag (see Fig. A.22). We derived a luminosity $L = 0.010 \pm 0.003\,L_\odot$ and a radius $R = 0.39 \pm 0.12\,R_\odot$. Combining the radius and the projected rotational velocity 27.6 ± 4.3 km s^{-1} (Malo et al. 2014), we determined $i = 20 \pm 5°$.

A very interesting feature that came out of the SuperWASP data was the discovery of a megaflare at HJD = 2454445.5 with a magnitude increase of ΔV = 3.29 mag.

– *TYC 112 1486 1*

Tc; $V-K_s$ = 3.11 mag; P = 2.18 d

TYC 112 1486 1 is a visual binary at a distance of d = 71 pc consisting of a K3V primary component separated by ρ = 0.42″ (29.8 AU; PA = 253°) from the secondary component, which is ΔK = 2.19 mag fainter. The two components have estimated masses $M_1 = 0.66\,M_\odot$, and $M_2 = 0.15\,M_\odot$. This system (unresolved) was first studied by Alcalá et al. (2000) who detected the Hα line in emission, the presence of a strong Li line ($EW_{H\alpha}$ = −0.90 Å and EW_{Li} = 510 ± 8 mÅ), and measured a projected rotational velocity $v\sin i$ = 17 ± 1 km s^{-1}. They identified this system as the optical counterpart of the X-ray source RXJ 0520.5+0616 detected by the ROSAT All Sky Survey. Biazzo et al. (2005) measured an effective temperature T = 4900 K and a metallicity [Fe$_I$/H] = −0.08 dex. The membership of the β Pictoris association was first proposed by Elliott et al. (2014), who collected repeated RV measurements and found no variability. Membership of the β Pictoris association was also considered by Alonso-Floriano et al. (2015). Bell et al. (2015) consider this star a member of the 32 Ori group with an estimated age of 22 ± 4 Myr. Elliott et al. (2016) found this star to be component of a hierarchical triple system together with the common proper motion stars TYC 112 917 1 and 2MASS 05195327+0617258.

Kiraga (2012) measured a photometric rotation period P = 2.18 d and a light curve amplitude ΔV = 0.09 mag from ASAS data.

– *TYC 112 917 1*

Tw; $V-K_s$ = 3.00 mag; P = 3.51 d

TYC 112 917 1 is a K3V star at a distance d = 67.8 pc and with an estimated mass $M = 0.67\,M_\odot$. This star is found by Elliott et al. (2016) to be common proper motion of TYC 112 1486 1 at a separation of 39 269 AU. This system (unresolved) was first studied by Alcalá et al. (2000) who detected the Hα line in emission, the presence of a strong Li line ($EW_{H\alpha}$ = −0.20 Å and EW_{Li} = 470 ± 5 mÅ), and measured a projected rotational velocity $v\sin i$ = 8 ± 1 km s^{-1}. They identified this system as the optical counterpart of the

X-ray source RXJ 0520.0+0612 detected by the ROSAT All Sky Survey.
Kiraga (2012) measured a photometric rotation period P = 3.51 d and a light curve amplitude ΔV = 0.085 mag from ASAS data.

– *2MASS J05241914-1601153*

Bc; $V - K_s$ = 5.603 mag; P = 0.4008 d

2MASS J05241914-1601153 is classified as M4.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 11 pc. It is associated with the X-ray source 1RXS J052419.1-160117 with L_X/L_{bol} = −3.14. Bergfors et al. (2010) discovered that it is a visual binary consisting of M4.5 + M5.0 components separated by ρ = 0.639″ (PA = 69.1°; ∼13 AU) with magnitude differences $\Delta z'$ = 0.36 mag and $\Delta i'$ = 0.43 mag. Subsequently, Janson et al. (2014) estimated an orbital period of 40 yr or longer and a likely close to edge-on orbit. Malo et al. (2013, 2014b) suggested it is a member of the β Pictoris association and inferred a statistical distance $d = 20 \pm 5$ pc and measured a $v \sin i$ = 50 ± 4.5 km s^{-1}. Binks & Jeffries (2014, 2016) confirmed it as a member and inferred a kinematic distance $d = 31.6 \pm 4.9$ pc.
We retrieved a photometric time series from CSS catalog and found a rotation period P = 0.4008 d with high confidence level (see Fig. A.23). Other significant power peaks do not conciliate with radius and projected rotational velocity.

– *HIP 25486 (AF Lep)*

SB2; $V - K_s$ = 1.294 mag; P = 0.9660 d

HIP 25486 is a SB2 system with a F7V primary component and a mass ratio q = 0.72 (Nordström et al. 2004; Torres et al. 2008). The SEEDS images did not detect any companion candidates within 7.5″ (∼200 AU projected; Brandt et al. 2014). The membership of the association was first proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), and then by Torres et al. (2006), Fernández et al. (2008), Binks & Jeffries (2014), and Mamajek & Bell (2014). Weise et al. (2010) reported $v \sin i$ = 71.6 km s^{-1}; White et al. (2007) $v \sin i$ = 55.18 km s^{-1}; Scholz et al. (2007) $v \sin i$ = 52 km s^{-1}; Valenti & Fischer (2005) $v \sin i$ = 54.7 km s^{-1}, and de la Reza & Pinzón (2004) $v \sin i$ = 50 km s^{-1}.
The most recent and detailed photometric investigation was carried out by Järvinen et al. (2015) who measured a rotation period P = 0.9660 d, which is in agreement with the rotational velocity and a radius, $R = 1.18\,R_{\odot}$, of a middle (i = 50°) inclination star.

– *2MASS J05294468-3239141*

S?; $V - K_s$ = 5.474 mag; P = 1.532 d

2MASS J05294468-3239141 is a M4.5Ve star (Cutispoto 1996; Janson et al. 2012) proposed by Riedel et al. (2014) as member of the association at a trigonometric distance d = 26 pc. We have no multiple RV measurements to establish its single/binary nature. Our periodogram analysis of the SuperWASP magnitude time series, with a photometric accuracy σ = 0.03 mag, allowed us to measure a rotation period $P = 1.532 \pm 0.005$ d and a peak-to-peak light curve amplitude ΔV = 0.05 mag (see Fig. A.24). Unfortunately, the projected rotational velocity has never been measured to derive the inclination of the rotation axis.

– *TYC 4770 0797 1 (V1311 Ori)*

Bc; $V - K_s$ = 4.311 mag; P = 4.372 d

TYC 4770 0797 1 is a close visual binary whose components are M2 + M3.5 with a separation ρ = 0.20″ (∼4.4 AU) and an estimated orbital period P = 23 yr (Janson et al. 2014) at a distance d = 22 pc. Hartmann et al. (1986) measured $v \sin i$ = 12 km s^{-1}; whereas da Silva et al. (2009) also reported the same projected rotational velocity $v \sin i$ = 12 km s^{-1}. The membership was proposed by Torres et al. (2006), da Silva et al. (2009), McCarthy & White (2012), and Malo et al. (2014a). It is, however, questioned by Janson et al. (2014) who detected a significant but relatively modest orbital motion, despite the estimated 23 yr orbital period. Since the system is seen almost edge-on, the system orbital plane may be aligned with the components equatorial planes. This configuration may be an explanation of the measured relatively modest orbital rate. The membership has been recently rejected by Binks & Jeffries (2016).
The first rotation period determination, P = 4.5 d, was reported by Gahm et al. (1993) with the warning that it needed confirmation, since the star was observed for a time span of only six days. A similar period P = 4.37 d is found by Kiraga (2012) from ASAS data. Our analysis of ASAS data confirms a period P = 4.37 d. Moreover, we retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 4770000050). The LS and CLEAN periodograms also determined the rotation period to be $P = 4.372 \pm 0.002$ d (see Fig. A.25).

– *2MASS J05335981-0221325*

S; $V - K_s$ = 4.725 mag; P = 7.23 d

2MASS J05335981-0221325 is classified as M3V by Riaz et al. (2006) from TiO-band strength at a spectroscopic distance d = 25 pc. It is associated with the X-ray source 1RXS J053359.8-022131. Its X-ray to bolometric luminosity is L_X/L_{bol} = −2.88. It was proposed by Malo et al. (2013, 2014a) as a high-probability member of the association. They inferred a statistical distance d = 42 pc and did not find evidence of RV variation. The membership of the β Pictoris association was confirmed by Binks & Jeffries (2014, 2016). Kiraga (2012) reported a period P = 7.25 d and a light curve amplitude ΔV = 0.17 mag from ASAS data. We retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 4770000109). The LS and CLEAN periodograms confirmed the rotation period $P = 7.23 \pm 0.02$ d and light curve amplitude ΔV = 0.10 mag (see Fig. A.26). We derived a luminosity $L = 0.093 \pm 0.025\,L_{\odot}$ and a radius $R = 0.89 \pm 0.29\,R_{\odot}$. Combining $v \sin i = 5.4 \pm 1.3$ km s^{-1} from Malo et al. (2014a) and the stellar radius, we derived $i = 60 \pm 10°$.

– *2MASS J06131330-2742054*

Tc; $V - K_s$ = 5.23 mag; P = 16.8 d

2MASS J06131330-2742054 is a close visual binary whose components have a separation ρ = 0.095″ (∼2.7 AU), a magnitude difference in the optical ΔV = 0.59 (FGS *F583W* filter), and an estimated orbital period P > 4 yr (Bowler et al. 2015, report 8.3 yr) at a trigonometric distance d = 29.4 pc (Riedel et al. 2014). Actually, the HST observations reported by Riedel et al. (2014) indicate that the A component is itself a binary. Riaz et al. (2006) inferred a M3.5V spectral type from the TiO-band strength for the unresolved system. It is associated with the X-ray source 1RXS J061313.2-274205. Its X-ray to bolometric luminosity is L_X/L_{bol} = −3.05. Malo et al. (2013) inferred a M4 spectral type and proposed its membership to the association. The membership was also confirmed by Riedel et al. (2014) who suggested it may be a common proper motion companion of 2MASS J06085283−2753583, a brown dwarf member of the β Pictoris association. Malo et al. (2014b) concluded it is a bona fide member of the association.
Hosey et al. (2015) reported evidence of photometric variability with a possible period of ∼0.4 yr. Our analysis of SuperWASP data time series allowed us to find three photometric rotation periods P = 39 d, P = 17.7 d, and P = 8.6 d, whose powers never differ by more than 30%. We observed this system at YCO and found in all B, V, and R filters two major periods P = 36.6 d and P = 16.8 d (see Fig. A.27). However, the longer periods are in disagreement with either stellar radius ($R = 0.86\,R_\odot$ as reported by Malo et al. 2014b) or the projected rotational velocity $v \sin i$ = 2.4 km s^{-1} (Malo et al. 2013). On the other hand, the shorter period $P \sim$ 17 d, independently found in both SuperWASP and YCO data, conciliates with both radius and projected rotational velocity.

– *HIP 29964 (AO Men)*

S+D; $V - K_s$ = 2.986 mag; P = 2.67 d

HIP 29964 is a K4Ve single star hosting a debris disk at a distance d = 39 pc (Carpenter et al. 2005). Its membership to the association was first proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), and then by Neuhäuser et al. (2003), Ortega et al. (2009), Makarov (2007), Torres et al. (2006), Lépine & Simon (2009), and is considered a bona fide member in all subsequent studies. de la Reza & Pinzón (2004) measured a $v \sin i$ = 13 km s^{-1}; Jayawardhana et al. (2006) $v \sin i$ =16 km s^{-1}; Torres et al. (2006) $v \sin i$ = 16.4 km s^{-1}; Scholz et al. (2007) $v \sin i$ = 15.96 km s^{-1}; Weise et al. (2010) $v \sin i$ = 15.9 km s^{-1}; and Cutispoto et al. (1999) $v \sin i$ = 17 km s^{-1}.
A rotation period P = 2.65 d was first reported by Cutispoto et al. (1999). A period P = 2.66 d was measured by Koen & Eyer (2002) from the HIPPARCOS data. Messina et al. (2010) found a rotation period P = 2.67 d from ASAS data, in agreement with the value P = 2.673 d as listed in the ACVS, and subsequently confirmed by Kiraga (2012). We derived a luminosity $L = 0.27 \pm 0.07\,L_\odot$ and a radius $R = 0.91 \pm 0.29\,R_\odot$. Combining the average $\langle v \sin i \rangle$ = 15.7 km s^{-1} and the stellar radius, we derived i = 70 ± 10°.

– *2MASS J07293108+3556003AB*

Bc; $V - K_s$ = 4.024 mag; P = 1.94 d

2MASS J07293108+3556003AB is a M1 + M3 visual binary whose components have a separation ρ = 0.198″ (∼8 AU), an inferred orbital period of about 38 yr, and magnitude differences of $\Delta z'$ = 1.15 mag and $\Delta i'$ = 1.28 mag (Janson et al. 2012, 2014). This system was proposed by Schlieder et al. (2012) as likely member of the β Pictoris association. However, the membership has recently been rejected by Binks & Jeffries (2016).
This star was regularly observed by SuperWASP starting from the end of 2006. However, the components could not be resolved. From this data we detected the most significant peak in the LS and CLEAN periodograms at P = 1.967 ± 0.005 d (see Fig. A.28). We assume it is the stellar rotation period of the brighter M1 component.

– *2MASS J08173943-8243298*

Bc?; $V - K_s$ = 5.032 mag; P = 1.318 d

2MASS J08173943-8243298 is classified as M3.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 14 pc. It is associated with the X-ray source 1RXS J081742.4-824331. Its X-ray to bolometric luminosity is L_X/L_{bol} = −3.01. It was proposed by Malo et al. (2014b) as member of the association with a statistical distance d = 27 pc. Furthermore, they measured a projected rotational velocity $v \sin i$ = 32.2 ± 2.6 km s^{-1}.
Kiraga (2012) reported a period P = 1.318 d and noted that it may also be a EB or Ell star.

– *2MASS J08224744-5726530*

Tc; $V - K_s$ = 5.568 mag; P = ? d

2MASS J08224744-5726530 is a triple system consisting of a M4.5 primary, a secondary component with spectral type later than L0 separated by ρ = 0.64″ (∼5.2 AU), and a farther M6 companion at a distance ρ = 8.43″ (∼67 AU) with a magnitude difference $\Delta z'$ = 1.83 mag (Bergfors et al. 2010), and at a spectroscopic distance d = 8 pc (Riaz et al. 2006). Similar values are measured by Janson et al. (2014). The M4.5 and M6 components are known to be common proper motion stars. This system was studied by Malo et al. (2014a) who measured $v \sin i$ = 6.4 ± 2.4 km s^{-1} and statistical distance d = 6 pc, and classified this star among the ambiguous candidate members of the β Pictoris association. The membership has been recently rejected by Binks & Jeffries (2016). We could not infer the rotation period from the ASAS time series.

– *2MASS J09361593+3731456AB (GJ 9303)*

SB2; $V - K_s$ = 4.100 mag; P = 12.9 d

2MASS J09361593+3731456AB is a M0.5 + M0.5 SB2 spectroscopic binary proposed by Schlieder et al. (2012) as a likely member of the β Pictoris association. However, Malo et al. (2013) raised some doubt based on the discrepant distance by 40 pc with respect to the average distance of bona fide members. Schlieder et al. (2012) measured a projected rotational velocity $v \sin i$ = 6 ± 2 km s^{-1}, whereas Malo et al. (2014a) measured $v \sin i$ = 1.9 km s^{-1}.
This star was regularly observed by SuperWASP starting from the end of 2006. Considering this data, we found the

most significant peak in the LS and CLEAN periodograms is at P = 12.9 d (see Fig. A.29). We assume it is the stellar rotation period that is in agreement with the lower $v \sin i$ measurement. Together with other three bona fide β Pictoris members of similar spectral type, this system is among the slowest members. It is interesting to note that Schlieder et al. (2012), based on the large variation of RVs of both components over timescales as small as one day, suspected that the system may have a short orbital period. If this is the case, then we may deal with a nonsynchronized system where the rotation period is longer than the orbital one.

– *2MASS J10015995+6651278*

Bc?; $V - K_s$ = 4.159 mag; P = 2.49 d

2MASS J10015995+6651278 is a M3 dwarf (Schlieder et al. 2012). Only one RV measurement is available for this star from Schlieder et al. (2012), which does not allow us to establish its single/binary nature. The membership was proposed by Schlieder et al. (2012), but recently rejected by Binks & Jeffries (2016).
We carried out a first attempt to measure the photometric rotation period in 2012 using the facilities at the Xinglong station. We observed it for only five nights collecting a total of 26 frames in the V filter. Our LS and CLEAN periodograms did not reveal any significant periodicity, but we detected one likely flare event with a magnitude brightening of ΔV = 0.32 mag. However, this star was also observed by NSVS (ID 2549392) and in this case our LS and CLEAN analyses of this time series allowed us to derive a firm determination of the stellar rotation period, $P = 2.49 \pm 0.02$ d, and a light curve amplitude of ΔV = 0.06 mag (see Fig. A.30). We found the same rotation period $P = 2.50 \pm 0.01$ in the LS and CLEAN periodograms of the INTEGRAL/OMC time series (ID 4143000079) with an amplitude for the light rotational modulation ΔV = 0.04 mag (see Fig. A.31). We inferred a luminosity $L = 0.054 \pm 0.014\,L_\odot$, a radius $R = 0.58 \pm 0.19\,R_\odot$, and $i = 90 \pm 15°$ when we combined R and P with the projected rotational velocity $v \sin i$ = 12 km s^{-1} (Schlieder et al. 2012).

– *HIP 50156 (DK Leo)*

Bc; $V - K_s$ = 3.819 mag; P = 8.05 d

HIP 50156 is a close visual binary consisting of a M0.5V primary component separated by $\rho = 0.09''$ (∼2.3 AU) from the secondary of unknown spectral type, and at a distance d = 23.1 pc (Bowler et al. 2015). The possible membership of the β Pictoris association was first proposed by Schlieder et al. (2012), whereas Shkolnik et al. (2009) suggested that this star has an age of ∼400 Myr. Subsequently, Shkolnik et al. (2012) proposed the membership of the Carina association. On the other hand, Malo et al. (2013) proposed the membership of Columba, whereas Klutsch et al. (2014) estimated an age similar to that of the Pleiades. Recently, Binks & Jeffries (2014, 2016) confirmed the membership of the β Pictoris association. López-Santiago et al. (2010) measured $v \sin i$ = 7.68 ± 0.7 km s^{-1}.
The photometric rotation period P = 8.05 d was first measured by Busko et al. (1980). Later, Kiraga (2012) reported P = 7.86 d based on ASAS time series.

– *TWA 22*

Bc; $V - K_s$ = 6.301 mag; P = 0.84 d

TWA 22 is a visual close binary consisting of M5 + M6 components separated by $\rho = 0.1''$ (∼1.7 AU). The orbital plane has an inclination $i = 27.43 \pm 4.40°$ and the orbital period is $P = 5.15 \pm 0.09$ yr (Bonnefoy et al. 2009). Scholz et al. (2007) reported $v \sin i$ = 9.67 kms^{-1}; and Jayawardhana et al. (2006) $v \sin i$ = 9.7 kms^{-1}. Song et al. (2003) first suggested its membership to the TW Hya association, based on the high lithium content. Torres et al. (2008) considered TWA 22 a candidate member of the β Pictoris association, and its membership was confirmed with the revised kinematic data by Teixeira et al. (2009). Also Malo et al. (2014b) and Elliott et al. (2016) considered it to be a bona fide member of the association.
Our analysis of ASAS data revealed in a few seasons the period P = 0.84 d, and P =1.54 d in other seasons. Our analysis of INTEGRAL/OMC time series (ID 8600000041), although the very low photometric precision (σ = 0.37 mag), seems to give P = 0.84 d as the correct rotation period (see Fig. A.32).

– *BD+262161AB*

Bw+D; $(V - K_s)_A$ = 2.61 mag; $(V - K_s)_B$ 3.25 mag; P = 2.022 d; P = 0.973 d

BD+ 262161AB is a visual binary consisting of K2 + K5 components separated by $\rho = 5.26''$ (∼115 AU) (Mason et al. 2001). This star was proposed by Schlieder et al. (2012) as a likely member of the β Pictoris association. However, its UVW space velocity components would place it right at the edge of the β Pictoris association in all three velocity components, and furthermore it lies about 30 pc above the bulk of the bona fide β Pictoris members. Brandt et al. (2014) considered its membership to be highly doubtful. The SEEDS images revealed no companion candidates other than the known K5 secondary component.
This system was observed by SuperWASP with sparse observations since 2006 and in a regular way starting from 2007. Owing to the ∼5.26″ separation, SuperWASP could not resolve the system's components. Nonetheless, our LS and CLEAN periodograms were able to detect two highly significant periodicities, $P = 0.973 \pm 0.005$ d and $P = 2.022 \pm 0.005$ d, which likely represent the rotation periods of the two components (see Fig. A.33). The only available measurement of the projected rotational velocity, $v \sin i$ = 6 ± 2 km s^{-1} (Schlieder et al. 2012), refers to the fainter K5 component. A comparison with Siess et al. (2000) models shows that these components are below the sequence traced by the β Pictoris members, as better fitted by isochrones corresponding to older ages.
This system was observed at ARIES in the VRI filters. We observed it for only six nights. However, we retrieved the same P = 2.02 d period in the R and I filters.

– *2MASS J11515681+0731262*

SB2; $V - K_s$ = 4.613 mag; P = 2.291 d

2MASS J11515681+0731262 is a close visual binary consisting of M2 + M8 components separated by $\rho = 0.5''$

(∼18 AU) with a magnitude difference ΔJ = 5.4 mag, and at a photometric distance $d = 37 \pm 6$ pc (Bowler et al. 2015). The primary component is itself a M2.5 + M2.5 spectroscopic binary whose components A and B have projected rotational velocities $v \sin i_{\rm A} = 14 \pm 2$ km s^{-1} and $v \sin i_{\rm B} = 12 \pm 2$ km s^{-1}, and unblended magnitudes $V_{\rm A}$ = 13.01 mag and $V_{\rm B}$ = 13.57 mag, respectively (Bowler et al. 2015). We retrieved one spectrum in the 3800−9000 Å region from the LAMOST archive. From our analysis we inferred a M2 spectral type for the primary component and detected the Hα line in emission with $EW = -1.66 \pm 0.13$ Å.
Schlieder et al. (2012) listed this star among the high-probability candidate members of the β Pictoris association and inferred a kinematic distance d = 33.2 pc. However, Bowler et al. (2015) concluded that this system does not belong to any specific young moving group. On the other hand, the membership of the β Pictoris association was recently rejected by Binks & Jeffries (2016).
Kiraga (2012) reported a photometric rotation period P = 2.291 d and a light curve amplitude ΔV = 0.13 mag.

– *2MASS J13545390-7121476*

S?; $V - K_{\rm s}$ = 4.568 mag; P = 3.65 d

2MASS J13545390-7121476 is classified as M2.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 28 pc. It is associated with the X-ray source 1RXS J135452.3-712157 with an X-ray to bolometric luminosity $L_{\rm X}/L_{\rm bol} = -3.39$. It is listed by Malo et al. (2013) among the candidate members of the association with 91% probability and a predicted distance d = 24 pc. Malo et al. (2014a) measured an upper limit for the projected rotational velocity $v \sin i < 3.5$ km s^{-1} and re-evaluate the membership probability obtaining 99.1% when the RV information is also considered. They also determined a smaller predicted distance of d = 21 pc.
This star was observed at the YCO from June 14 until September 20, 2014, for a total of ten nights. We obtained a total of 49 frames in the V and R filters and 44 frames in B filter. We analyzed all time series with LS and CLEAN periodograms and derived the most powerful power peak at $P = 3.65 \pm 0.01$ d in the V and R time series with peak-to-peak light curve amplitudes ΔV = 0.025 mag and ΔR = 0.020 mag (see Fig. A.34). We derived a luminosity $L = 0.024 \pm 0.007\,L_\odot$, a radius $R = 0.43 \pm 0.14\,R_\odot$, and an inclination $i = 30 \pm 5°$.

– *HIP 69562 (MV Vir)*

Tc; $V - K_{\rm s}$ = 3.669 mag; P = 0.2982 d

HIP 69562 is a visual triple system. The primary component A is a K5.5V star with a nearby component B at $\rho = 0.3''$, and a farther third component C at $\rho = 1.3''$ from the primary (Mason et al. 2001) at a distance d = 30 pc. Malo et al. (2013) measured the projected rotational velocities of the components A and C: $v \sin i = 102 \pm 9$ km s^{-1} and $v \sin i = 24 \pm 3$ km s^{-1}, respectively. Its membership to the β Pictoris association was suggested by Malo et al. (2013, 2014b) and it was also considered as a member by Bell et al. (2015) and Alonso-Floriano et al. (2015).
Kiraga (2012) measured a photometric rotation period P = 0.2982 d, which likely refers to the primary A component.

– *TYC 915 1391 1*

S; $V - K_{\rm s}$ = 3.600 mag; P = 4.34 d

TYC 915 1391 1 was classified as K4V by Stephenson (1986), and later as M0V by Lépine & Simon (2009). Schlieder et al. (2012) classified this star as a high-probability candidate member of the β Pictoris association and inferred a kinematic distance d = 51.8 pc. We retrieved one spectrum in the 3800–9000 Å region from the LAMOST archive. From our analysis, we inferred a K7V spectral type and detected the Hα line in emission with $EW = -3.37 \pm 0.11$ Å.
In the ASAS Catalog of Variable stars (Pojmanski 2002) it is listed with a photometric rotation period P = 4.340 d and a light curve amplitude ΔV = 0.36 mag. Hoffman et al. (2009) reported a similar photometric rotation period P = 4.329 d and a light curve amplitude ΔV = 0.28 mag inferred from the NSVS survey.

– *HIP 76629 (V343 Nor)*

SB1; $V - K_{\rm s}$ = 2.118 mag; P = 4.27 d

HIP 76629 is a triple system consisting of a SB1 K0V binary with a nearby M5Ve visual companion (HD139084B) at an angular separation $\rho = 10''$ (∼400 AU) and ΔV = 6.8 mag (Song et al. 2003). Thalmann et al. (2014) derived (see, also Guenther & Esposito 2007; Torres et al. 2006) a tentative orbital solution from RV variations for an additional companion with minimum mass $M = 0.11\,M_\odot$ and a period of about 4.5 years and moderate eccentricity (0.5–0.6). The membership was first proposed by Zuckerman et al. (2001), later by Song et al. (2003), Zuckerman & Song (2004), Makarov (2007), Torres et al. (2006), Lépine & Simon (2009), and Malo et al. (2013). The following values of rotational velocity were measured $v \sin i$ = 11 km s^{-1} by de la Reza & Pinzón (2004); $v \sin i$ = 16.6 km s^{-1} by Torres et al. (2006); $v \sin i$ = 17 km s^{-1} by Scholz et al. (2007); and $v \sin i$ = 18.2 km s^{-1} by Weise et al. (2010).
A rotation period P = 4.20 d was first reported by Udalski & Geyer (1985); then P = 4.4 d by Lloyd Evans & Koen (1987); P = 4.567 d by Cutispoto (1993); P = 4.25 d by Cutispoto (1996); P = 4.32 d by Cutispoto (1998b); and P = 4.24 d by Cutispoto (1998a). Messina et al. (2010) found the same period P = 4.27 d from ASAS photometry, which does not resolve the visual companion.
Among SB members of the β Pictoris association, HIP 76629 exhibits the longest rotation period.

– *2MASS J16430128-1754274*

S; $V - K_{\rm s}$ = 3.951 mag; P = 5.14 d

2MASS J16430128-1754274 is classified as a M0.5 star by Riaz et al. (2006) from the TiO-band strength and with a spectroscopic distance d = 59 pc. It is associated with the X-ray source 1RXS J164302.3-175418 with a normalized X-ray to bolometric luminosity $L_{\rm X}/L_{\rm bol} = -3.11$.

We consider this star a single since Siebert et al. (2011), Kiss et al. (2011), and Binks & Jeffries (2014) find similar values of RV. This star was first proposed by Kiss et al. (2011) as a member of the association and, subsequently, confirmed by Malo et al. (2013) and Binks & Jeffries (2014, 2016). Malo et al. (2013) measured an average projected rotational velocity $v \sin i = 8.8 \pm 2.5$ km s^{-1} and Binks & Jeffries (2014) $v \sin i = 8.7 \pm 2.7$ km s^{-1}.
Messina et al. (2011) reported a period $P = 5.14$ d inferred from the ASAS time series. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 6221000015). We found a rotation period $P = 4.74 \pm 0.01$ d and a light curve amplitude $\Delta V = 0.12$ mag (see Fig. A.35). However, the data extraction is reported to be affected by point spread function (PSF) problems. We inferred a luminosity $L = 0.10 \pm 0.023\, L_{\odot}$, a radius $R = 0.73 \pm 0.24\, R_{\odot}$ and $\sin i = 1.20 \pm 20$. Taking into consideration the uncertainties, we can assume this star is seen equator on.

– *2MASS J16572029-5343316*
S; $V - K_s = 4.646$ mag; $P = 7.15$ d

2MASS J16572029-5343316 is classified as M3V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 28$ pc. It is associated with the X-ray source 1RXS J165719.9-534328 with a normalized X-ray to bolometric luminosity $L_X/L_{bol} = -3.55$. Malo et al. (2013) proposed this star as candidate member at a predicted distance $d = 5$ pc and a membership probability of 99.5% with no evidence of RV variations. Malo et al. (2014a) measured $v \sin i < 3.5$ km s^{-1} and revised the membership probabiliy to 91%, which increased to 99.9% when the RV information was also considered.
This star was observed at the YCO from June 14 until September 20, 2014, for a total of ten nights. We obtained a total of 49 frames in the B, 48 in the V, and 41 in the *R* filter. We analyzed all time series with LS and CLEAN periodograms and derived the most powerful power peaks at $P = 33$d in both periodograms and $P = 7.15 \pm 0.03$ d with a peak-to-peak light curve amplitude $\Delta V = 0.025$ mag only in the LS periodogram (see Fig. A.36). We assume the shorter rotation period to be more consistent with the upper value of projected rotational velocity. We inferred a luminosity $L = 0.13 \pm 0.03\, L_{\odot}$, a radius $R = 1.01 \pm 0.34\, R_{\odot}$, and $i = 30 \pm 5°$.

– *2MASS J17150219-3333398*
Bc?; $V - K_s = 3.862$ mag; $P = 0.3096$ d

2MASS J17150219-3333398 is classified as M0V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 31$ pc. It is associated with the X-ray source 1RXS J171502.4-333344 with $L_X/L_{bol} = -3.10$. A X-ray flare was detected by Nazé et al. (2010). It was proposed by Malo et al. (2013) as member of the association. Malo et al. (2014a) measured a projected rotational velocity $v \sin i = 76.3 \pm 5.3$ km s^{-1} and a statistical distance $d = 23$ pc. Kiraga (2012) measured a rotation period $P = 0.3106$ d from the ASAS time series. We retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 7366000048) and found a rotation period $P = 0.3096 \pm 0.0005$ d and a light curve amplitude $\Delta V = 0.04$ mag (see Fig. A.37). We inferred a luminosity $L = 0.063 \pm 0.016\, L_{\odot}$, a radius $R = 0.55 \pm 0.18\, R_{\odot}$, and $i = 58 \pm 10°$.

– *HD 155555ABC (V824 Ara)*

Tw; $(V - K_s)_{AB} = 2.528$ mag; $P_{AB} = 1.687$ d; $(V - K_s)_C = 5.081$ mag; $P_B = 4.43$ d

HD 155555 is a triple stellar system at a distance $d = 31.4 \pm 0.5$ pc (van Leeuwen 2007). This system consists of a double-line spectroscopic binary HD 155555AB, also known as V824 Ara, and a fainter M dwarf companion HD 155555C at an angular distance $\rho = 33''$ (~1040 AU).
The spectroscopic binary HD 155555AB was discovered by Bennett et al. (1967) to be composed of G5IV + K0IV stars that rotate with an orbital period $P = 1.687$ d. The most recent determination of orbital and physical properties, and first magnetic maps of both components were provided by the spectro-polarimetric study of Dunstone et al. (2008). The membership of HD155555AB of the β Pictoris association was first suggested by Zuckerman et al. (2001) based on distance, UVW velocity components, high $v \sin i$, and L_X/L_{bol} ratio, later confirmed by Torres et al. (2006), Makarov (2007), and Lépine & Simon (2009).
The fainter HD155555C component (also named LDS 587B) is a M3.5 dwarf (Pasquini et al. 1991). The most recent photometric investigation of this system was carried out by Messina et al. (2015b), who confirmed the rotation period of the spectroscopic binary and discovered for the first time the rotation period $P = 4.43 \pm 0.01$ d of HD155555C. This paper provides a more detailed description of the system.

– *TYC 8728 2262 1*

S; $V - K_s = 2.186$ mag; $P = 1.775$ d

TYC 8728 2262 1 is classified as K1V star by Torres et al. (2006) at a distance $d = 66$ pc. Their RV measurements together with those from Song et al. (2012) and Elliott et al. (2014) do not show evidence of significant variation. Therefore, we consider it a single star. Torres et al. (2006) proposed it as a member of the association and measured a $v \sin i = 35.3$ km s^{-1}. Its membership was subsequently suggested by Kiss et al. (2011), whereas Song et al. (2012) proposed the membership to the Upper-Scorpius subgroup of the Sco-Cen complex with a photometric distance $d = 72$ pc. Brandt et al. (2014) gave a lower 50% membership probability of the β Pictoris association.
Messina et al. (2010) measured a rotation period $P = 1.819$ d inferred from ASAS time series. The same period was later reported by Kiraga (2012). The periodogram analysis carried out by Desidera et al. (2015) revealed two other significant periodicities at $P = 2.21$ d and $P = 0.686$ d. However, the longest period does not conciliate with the radius nor with the projected rotational velocity. The shortest period would imply an inclination $i \sim 20°$, which is too low to allow the observed light curve amplitude of $\Delta V = 0.12$ mag. Therefore, these periodicities likely arise from aliasing. We inferred a luminosity $L = 0.70 \pm 0.19\, L_{\odot}$, a radius $R = 1.10 \pm 0.35\, R_{\odot}$, and $\sin i = 1.15 \pm 0.10$ when $P = 1.819$ d is assumed as the rotation period. We retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 8728000045). The LS and CLEAN periodograms confirmed the rotation period to be $P = 1.775 \pm 0.005$ d with a light curve amplitude $\Delta V = 0.15$ mag (see Fig. A.38).

– *GSC 08350-01924*

Bc; $V - K_s = 4.766$ mag; $P = 1.906$ d

GSC 08350-01924 is classified as M3V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 29$ pc. It is associated with the X-ray source 1RXS J172919.1-501454 with $L_X/L_{bol} = -3.35$. It was proposed by Torres et al. (2006) as member of the association. Kiss et al. (2011) also considered it a member. Malo et al. (2013, 2014a) and Elliott et al. (2015, 2016) also found it to be a high-probability member.
Torres et al. (2008) reported on the discovery of a close companion separated by 0.8″ (~60 AU). Malo et al. (2014a) measured $v \sin i = 23.5 \pm 1.9$ km s^{-1}, inferred a distance d = 64 pc, and did not detect any significant RV variation.
We observed this target at the YCO in the BVR filters and measured a rotation period $P = 1.906 \pm 0.005$ d and an amplitude of light curve $\Delta V = 0.10$ mag (see Fig. A.39). We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 8350000036). However, all frames are reported to have bad PSF. Their LS and CLEAN periodograms revealed a rotation period $P = 1.24 \pm 0.01$ d, which we mention to provide more complete information but we do not use it in our analysis.

– *HD 160305*

S+D; $V - K_s = 1.358$ mag; $P = 1.336$ d

HD 160305 is listed in the HIPPARCOS catalog as a F9V star. This star hosts a debris disk (Patel et al. 2014). It was identified as new member of the association by Kiss et al. (2011) who did not find evidence that this star may reside in a tight multiple system. Song et al. (2012) suggested it is younger than the β Pictoris association and belongs to the Scorpius-Centaurus complex.
Messina et al. (2011) from LS and CLEAN analyses of ASAS data detected two periodicities, $P = 3.92$ d and P = 1.336 d, which are present in almost all seasons. These are in 1-d beat relation, meaning that only one is the true rotation period. Unfortunately, no $v \sin i$ is measured to independently constrain the rotation period. Similar periods $P = 3.93$ d and $P = 1.339$ d were also found by Kiraga (2012). Based on the color-period distribution of β Pictoris members, the shorter period $P = 1.336$ d, also reported by Messina et al. (2011), is closer, but still longer than the periods of single bona fide members. The periodogram of HIPPARCOS data gives $P = 3.63$ d, but other peaks of comparable power are present. We retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 8355000055). However, neither $P = 1.33$ d nor $P = 3.93$ d were found in the periodograms. We inferred a luminosity $L = 1.97 \pm 0.54\, L_{\odot}$ and a radius $R = 1.27 \pm 0.39\, R_{\odot}$.

– *TYC 8742 2065 1*

Tc; $V - K_s = 2.164$ mag; $P = 2.60/1.62$ d

TYC 8742 2065 1 is a triple system consisting of a SB2 K0IV+? with a nearby visual companion (Torres et al. 2008) physically associated (Chauvin et al. 2010) at $\rho = 0.114''$ (PA = 232°) and ΔK = 0.2 mag. Torres et al. (2006) listed this system among the members of the association, whereas Song et al. (2012) suggested it is younger than the members of the β Pictoris association and belongs to the Scorpius-Centaurus complex. Torres et al. (2006) reported a $v \sin i = 10 \pm 1.4$ km s^{-1} and Weise et al. (2010) $v \sin i$ = 10.1 ± 1 km s^{-1}.
The periodogram analysis of Messina et al. (2010) revealed two peaks at $P = 2.60$ d and $P = 1.62$ d. The period P = 1.614 d is also reported by Kiraga (2012). The shorter period may be the rotation period of the SB2. The longer period may be the rotation period of the visual companion.

– *HIP 88399*

Bw; $V - K_s = 4.227$ mag; P = ?

HIP 88399 is a F6V + M2Ve spectroscopic binary whose components are separated by $\rho = 6.44''$ (PA = 89°; Rameau et al. 2013). The membership of the association was first proposed by Zuckerman et al. (2001), later by Zuckerman & Song (2004), Moór et al. (2006), Torres et al. (2006), Makarov (2007), and Lépine & Simon (2009). Scholz et al. (2007) reported $v \sin i_A = 22.5$ km s^{-1} and Torres et al. (2006) $v \sin i_A = 20.0$ km s^{-1}. From our analysis of ASAS time series we could not derive the stellar rotation period.

– *V4046 Sgr*

SB2+D; $V - K_s = 3.191$ mag; $P = 2.42$ d

V4046 Sgr is a spectroscopic binary consisting of two nearly equal-mass K5Ve + K7Ve components (Stempels & Gahm 2004) separated by 0.045 AU with a nearby visual M1e companion UCAC2 18035440 at $\rho = 2.82'$ (Kastner et al. 2011). The binary hosts a circumbinary dust disk (Jensen & Mathieu 1997) and it is actively accreting from a gaseous disk (Stempels & Gahm 2004). The circumbinary molecular disk is inclined at 33.5° (Rodriguez et al. 2010) and extends to ~350 AU. The membership was proposed by Torres et al. (2006) and confirmed by Kastner et al. (2011). It is also considered as bona fide member by Pecaut & Mamajek (2013), Malo et al. (2013, 2014b), and most recently by Elliott et al. (2014, 2015). The $v \sin i_A = 14.2$ km s^{-1} and $v \sin i_B = 13.7$ km s^{-1} are reported by Stempels & Gahm (2004) and $v \sin i_A = 14$ km s^{-1} by da Silva et al. (2009).
The first rotation period determination was $P = 1.7$ d by Busko & Torres (1978). A period $P = 2.43$ d was later reported by de La Reza et al. (1986); $P = 2.44$ d was found by Mekkaden & Sinachopoulos (1991). The orbital period $P = 2.4213305$ d from radial velocity measurements was determined by Quast et al. (2000), and $P = 2.42537$ d by Stempels & Gahm (2004). The LS and CLEAN periodogram analysis by Messina et al. (2010) revealed in almost all seasons two peaks at $P = 2.42$ d and $P = 1.71$ d. Assuming that the axial rotations of both components are synchronized with the orbital period, then we inferred that $P = 1.71$d is the beat period. On the other hand, we note that in the time interval JD 2453576–2453580, when ASAS observations were very highly sampled for a total of about 300 observations, the period $P = 2.42$ d is absent, whereas $P = 1.71$ d is highly significant.

– *UCAC2 18035440*

SB; $V - K_s$ = 4.241 mag; P = 12.05 d

UCAC2 18035440 is classified as M1.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 51 pc. It is associated with the X-ray source 1RXS J181422.6-324622 with L_X/L_{bol} = −2.69. Torres et al. (2006) reported a $v \sin i$ = 3 ± 1.5 km s^{-1} and suggested it may be a spectroscopic binary. These authors first proposed its membership of the β Pictoris association. Kastner et al. (2011) suggested this star is likely a widely separated (ρ = 2$''$.82) companion of V4046 Sgr on the basis of common proper motions and radial velocities. However, to be coeval, the star must be a spectroscopic binary (M1+M1), as suspected by Torres et al. (2006). Elliott et al. (2014) reported a larger distance d = 98.1 pc derived from XYZ positions. Song et al. (2012) suggested a membership to the Upper Scorpius and inferred a photometric distance d = 71 pc.
A rotation period P = 12.05 d was first reported by Nataf et al. (2010) based on the HATnet photometry. After Nataf et al. (2010), we have analyzed again the ASAS photometry and recovered, with both LS and CLEAN periodograms, the same period P = 12.08 d in two seasons. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 7396000227). In the LS periodogram, we found the major peak at P = 5.96 d and a light curve amplitude ΔV = 0.14 mag (see Fig. A.40). This period is half of the rotation period measured by Nataf et al. (2010). This may arises from the presence of two major spot groups on opposite hemispheres at the epochs of INTEGRAL/OMC observations.

– *2MASS J18151564-4927472*

SB1; $V - K_s$ = 4.78 mag; P = 0.447 d

2MASS J18151564-4927472 is classified as M3V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 29 pc. It is associated with the X-ray source 1RXS J181514.7-492755 with L_X/L_{bol} = −3.17. Malo et al. (2013) suggested its membership of the association with a probability of 91.2% and inferred a distance d = 61 ± 4 pc. Moór et al. (2013) found that its kinematic properties match those of the β Pictoris members. However, owing to the lack of a detectable amount of Li, they proposed it as candidate member of the Argus association. Malo et al. (2014a) measured the projected rotational velocity $v \sin i$ = 76.7 ± 10.9 km s^{-1} and redetermined the membership probability to 89.4%, which increases to 99.9% when the RV information is considered. The large RV variation they measured suggests that it is a spectroscopic binary.
This star was observed at the YCO from May 23 until September 29, 2014, for a total of 12 nights. We obtained a total of 70 frames in the B and V filters and 64 frames in the R filter. We analyzed all time series with LS and CLEAN periodograms and derived the most powerful power peak at P = 0.447 ± 0.002 d with a peak-to-peak light curve amplitude Δmag = 0.09 mag by combining all filters (see Fig. A.41).

– *HIP 89829*

S; $V - K_s$ = 1.837 mag; P = 0.571 d

HIP 89829 is a G1V (Torres et al. 2006) single star (Waite et al. 2011) at a distance d = 75 pc as measured by HIPPARCOS. It was proposed by Torres et al. (2008) and Malo et al. (2013) as a high-probability member of the β Pictoris association. Its kinematics matches those of the β Pictoris members at the <2.0 sigma level (Desidera et al. 2015). Moreover, the large lithium EW, high levels of activity, and photometric variability are consistent with the β Pictoris membership assignment, and the isochrone fitting further supports the pre-MS status (age of 15 ± 3 Myr; Desidera et al. 2015). Torres et al. (2006) measured $v \sin i$ = 114.7 km s^{-1}, and a similar value $v \sin i$ = 114 km s^{-1} was measured by Waite et al. (2011).
The rotation period P = 0.571 d is reported by ACVS, Messina et al. (2010), and Kiraga (2012), where all measurements are based on the ASAS time series. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 6856000028) and found a rotation period P = 0.5687 ± 0.0005 d and a light curve amplitude ΔV = 0.07 mag (see Fig. A.42). We derived a luminosity L = 1.48 ± 0.40 $L_\odot$, a radius R = 1.38 ± 0.43 $R_\odot$, and an inclination i = 70 ± 12°.

– *2MASS J18202275-1011131 (FK Ser)*

Bw+D; $V - K_s$ = 3.350 mag; P = 4.65/5.15 d

2MASS J18202275-1011131 is a K5Ve + K7Ve visual binary whose components have a separation ρ = 1.33$''$ (~81 AU) and a magnitude difference ΔV = 0.7 mag. Anthonioz et al. (2015) reported the presence of a debris disk around the primary component. The membership was proposed by Torres et al. (2006) and by Malo et al. (2013, 2014a).
Chugainov (1974) first measured the photometric rotation period P = 5.20 d. Similar rotation period P = 5.15 d was subsequently found by Batalha et al. (1998). However, also a period P = 4.89 d by Batalha et al. (1998) is found in some seasons. These two periods may refer to the two components that, having similar brightness, can both contribute to the observed variability. Kiraga (2012) from ASAS data measured a rotation period P = 4.65 d with a light curve amplitude ΔV = 0.07 mag. Our analysis of ASAS time series found two peaks of comparable power at P = 4.65 d and P = 5.15 d. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 5681000021) and found a rotation period P = 5.00 ± 0.02 d and a light curve amplitude ΔV = 0.07 mag (see Fig. A.43). No projected rotational velocity is available to infer the inclination of the rotation axis.

– *2MASS J18420694-5554254*

S?; $V - K_s$ = 4.946 mag; P = 5.40 d

2MASS J18420694-5554254 is classified as M3.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 37 pc. It is associated with the X-ray source 1RXS J184206.5-555426 with L_X/L_{bol} = −2.77. Malo et al. (2014a,b) suggested it is a member of the association, measured an upper value of the projected rotational velocity $v \sin i$ < 8.4 km s^{-1}, and inferred a statistical distance d = 54 pc. Membership is also proposed by Elliott et al. (2016) who found the star 2MASS J18420483-5554126 to be

a common proper motion companion at a separation of 1138 AU.
Kiraga (2012) found a rotation period P = 5.403 d and a light curve amplitude ΔV = 0.07 mag from ASAS data. We retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 8762000047) and found a rotation period $P = 5.18 \pm 0.02$ d and a light curve amplitude ΔV = 0.16 mag (see Fig. A.44). We derived a luminosity $L = 0.065 \pm 0.018\,L_{\odot}$, a radius $R = 0.79 \pm 0.26\,R_{\odot}$, and an inclination $i = 70 \pm 15°$.

– *TYC 9077 2489 1*

Tc; $V - K_s$ = 3.204 mag; P = 0.3545 d

TYC 9077 2489 1 is a triple system consisting of a close visual binary and a wide A7V companion (HIP 92024) at a distance of 70″. The close binary has a primary component with K8V spectral type (Zuckerman et al. 2001), and is separated by ρ = 0.18″ (∼5 AU) from the secondary component that is ΔK = 2.3 mag fainter (Chauvin et al. 2010). Its membership to the association was first proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), and then by Moór et al. (2006), and was subsequently confirmed by Torres et al. (2006), Lépine & Simon (2009), and Elliott et al. (2016). de la Reza & Pinzón (2004) reported $v \sin i$ = 150 km s^{-1}; Jayawardhana et al. (2006) $v \sin i$ = 102.7 km s^{-1}, with the caveat that this value may be affected by line blending; Torres et al. (2006) measured $v \sin i$ = 110 km s^{-1} and García-Alvarez et al. (2011) $v \sin i$ = 121.3 km s^{-1}.
The rotation period P = 0.3545 d is reported by Messina et al. (2010) and García-Alvarez et al. (2011), which is likely the rotation period of the brighter component K8V of the close binary.

– *TYC 9073 0762 1*

S; $V - K_s$ = 3.946 mag; P = 5.37 d

TYC 9073 0762 1 is classified as an M1Ve star by Torres et al. (2006). It is associated with the X-ray source 1RXS J184657.3-621037 (Haakonsen & Rutledge 2009). Elliott et al. (2014) and Malo et al. (2013) did not find evidence of RV variations. Its membership to the association was first proposed by Torres et al. (2006), and then by Lépine & Simon (2009) who inferred a kinematic distance $d = 55.8 \pm 3.5$ pc. Brandt et al. (2014) proposed a lower 80% membership probability of the β Pictoris association. Moór et al. (2013) suggested that this star may be the wide separation (∼550″) companion of the F5V star HD 173167, having similar proper motions and radial velocities. Torres et al. (2006) measured a projected rotational velocity $v \sin i = 9.9 \pm 0.6$ km s^{-1}.
A rotation period P = 5.373 d is reported in ACVS. The same rotation period P = 5.37 d is also found by Messina et al. (2010) in all ASAS seasons. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 9073000047) and found the same rotation period $P = 5.35 \pm 0.01$ d and a light curve amplitude ΔV = 0.15 mag (see Fig. A.45). We derived a luminosity $L = 0.14 \pm 0.03\,L_{\odot}$, a radius $R = 0.95 \pm 0.12\,R_{\odot}$, and an inclination $i \sim 90°$.
We note that its light curve amplitude is significantly larger than the amplitude exhibited by other stars sharing similar rotation period and spectral type.

– *HD 173167*

SB1; $V - K_s$ = 1.144 mag; P = 0.29 d

HD 173167 is a probable SB1 binary consisting of F5V primary component. It is considered the wide companion of TYC 9073 0762 1 and, therefore, member of the β Pictoris association (Moór et al. 2013; Elliott et al. 2016).
From ASAS data time series (ASAS 184806-6213.8), we derived a rotation period P = 0.250 d with both LS and CLEAN periodogram analyses. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 9073000056) and found a similar rotation period $P = 0.291 \pm 0.001$ d and a light curve amplitude ΔV = 0.22 mag (see Fig. A.46). However, no projected rotational velocity has ever been measured to constrain this value. The light curve amplitude is very large for the F5V spectral type. Even assuming an inclination $i \sim 90°$ that maximizes the rotational modulation, such an amplitude has never been observed in F-type dwarfs.

– *TYC 7408 0054 1*

EB; $V - K_s$ = 3.66 mag; P = 1.075 d

TYC 7408 0054 1 is a K8Ve star (Lépine & Simon 2009). It is associated with the X-ray source 1RXS J185044.7-314748. Torres et al. (2006) first suggested its membership to the association, and later, Lépine & Simon (2009) who inferred a kinematic distance d = 51.2 pc, based on proper motion and membership of the association, and measured $v \sin i = 50 \pm 2$ km s^{-1}. Torres et al. (2006) measured $v \sin i$ = 49.7 km s^{-1}. The RV measurements from Torres et al. (2006), Lépine & Simon (2009), and Song et al. (2012) range from −3 to −7.1 km s^{-1}, suggesting it is a close binary star. Malo et al. (2013) found a membership probability of 92.5%, which increases to 99% when the RV information is also used. Song et al. (2012) listed this star among candidate members of the Upper Scorpius.
In the ACVS this star is reported to be a semi-detached or contact eclipsing binary with a period P = 1.04154 d. Messina et al. (2010) detected a longer period P = 1.089 d from their analysis of the same ASAS time series. A similar period P = 1.0420 d was subsequently reported by Kiraga (2012). An intriguing aspect of this star is that in most ASAS seasons only one light minimum is visible, whereas there is only evidence of two eclipses in three seasons. We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 7408000058) and found a similar rotation period $P = 1.075 \pm 0.005$ d and a light curve amplitude ΔV = 0.10 mag, but no evidence for eclipses (see Fig. A.47). Until spectroscopy is unavailable, we suspect that the double minima may arise from starspots on opposite hemispheres. We derived a luminosity $L = 0.201 \pm 0.05\,L_{\odot}$, a radius $R = 0.95 \pm 0.12\,R_{\odot}$, and an inclination $i \sim 90°$.

– *HIP 92680 (PZ Tel)*

Bw; $V - K_s$ = 1.924 mag; P = 0.94 d

HIP 92680 is a K8Ve single star with a substellar ∼28 $M_{\rm Jup}$ companion (Mugrauer et al. 2010). The membership of

the association was first proposed by Zuckerman et al. (2001), later by Zuckerman & Song (2004), Torres et al. (2006), and Makarov (2007), and Lépine & Simon (2009). Numerous measurements of projected rotational velocity are reported in the literature as follows: $v \sin i = 70\,\mathrm{km\,s^{-1}}$ (Randich et al. 1993); $v \sin i = 58\,\mathrm{km\,s^{-1}}$; (Soderblom et al. 1998); $v \sin i = 68\,\mathrm{km\,s^{-1}}$ (Barnes et al. 2000); $v \sin i = 70\,\mathrm{km\,s^{-1}}$ (Cutispoto et al. 2002); $v \sin i = 67\,\mathrm{km\,s^{-1}}$ (de la Reza & Pinzón 2004); $v \sin i = 69\,\mathrm{km\,s^{-1}}$ (Torres et al. 2006); and $v \sin i = 77.50\,\mathrm{km\,s^{-1}}$ (Scholz et al. 2007).
The first rotation period determinations were $P = 0.942$ d by Coates et al. (1980) and $P = 0.943$ d by Coates et al. (1982). Lloyd Evans & Koen (1987) reported $P = 0.9447$ d, and Innis et al. (1990) $P = 0.94486$ d. A period $P = 0.9447$ d is determined by Cutispoto (1998b), $P = 0.94$ d by Innis et al. (2007). Kiraga (2012) reported a period $P = 0.9457$ d. The most recent photometric investigation on both PZ Tel and the companion brown dwarf is reported by Maire et al. (2016) together with the high-contrast imaging results obtained with SPHERE at VLT. In that work the known rotation period of PZ Tel was confirmed by new photometric observations carried out at ESO with the Rapid Eye Mount (REM) Telescope and at the YCO.

– *TYC 6872 1011 1*

Bw; $V - K_s = 3.762$ mag; $P = 0.503$ d

TYC 6872 1011 1 is a M0Ve single star whose membership of the association was first proposed by Torres et al. (2006) who reported $v \sin i = 33.8\,\mathrm{km\,s^{-1}}$. Moór et al. (2013) suggested that this star is a likely member and may form a visual binary with UCAC2 19527490 at a distance of 28.3″ (∼2210 AU), as their RV and proper motions are consistent to each other. UCAC2 19527490 is also found by Elliott et al. (2016) to be the common proper motion companion. Malo et al. (2013, 2014a,b) also found it to be a high-probability member at a predicted distance $d = 76$ pc. It is also listed among the association members by Pecaut & Mamajek (2013) and Elliott et al. (2015, 2016).
The rotation period $P = 0.504$ d was determined by Messina et al. (2010) from ASAS data. In the time interval JD 2 452 781–245288, the ASAS sampling was very high, allowing a period measurement with a very high confidence level. The same period was subsequently reported by Kiraga (2012). We also retrieved a long photometric time series from the INTEGRAL/OMC archive (ID 6872000042) and found a rotation period $P = 0.343 \pm 0.005$ d and a light curve amplitude $\Delta V = 0.27$ mag (see Fig. A.48). However, this photometry is reported to suffer from bad PSF. We derived a luminosity $L = 0.31 \pm 0.1\,L_\odot$, a radius $R = 1.31 \pm 0.17\,R_\odot$, and an inclination $i \sim 15°$.

– *2MASS J19102820-2319486*

S; $V - K_s = 4.985$ mag; $P = 3.64$ d

2MASS J19102820-2319486 is classified as M4V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 18$ pc. It is associated with the X-ray source 1RXS J191028.6-231934 with $L_X/L_{bol} = -2.97$. Malo et al. (2013) suggested its membership to the association with a probability of 99.9% and a predicted statistical distance $d = 67 \pm 5$ pc. The membership was confirmed by Binks & Jeffries (2014, 2016) who derived a kinematic distance $d = 69.2 \pm 3.4$ pc, and again it was proposed as a candidate member by Malo et al. (2014a,b), who measured a projected rotational velocity $v \sin i = 12.2 \pm 1.8\,\mathrm{km\,s^{-1}}$ and found no evidence of significant RV variations.
This star was observed at the YCO from October 20 until November 11, 2014, for a total of seven nights. We obtained a total of 51 frames in the B, V, and R filters. We analyzed all time series with LS and CLEAN periodograms and derived the most powerful power peak at $P = 3.64 \pm 0.02$ d with a peak-to-peak light curve amplitude $\Delta V = 0.13$ mag (see Fig. A.49). We found the same period $P = 3.60 \pm 0.01$ d (see Fig. A.50) in the LS and CLEAN periodograms of SuperWASP data (1SWASP J191028.18-231948.0). We derived a luminosity $L = 0.12 \pm 0.03\,L_\odot$ and a radius $R = 1.09 \pm 0.15\,R_\odot$. Combining stellar radius, projected rotational velocity, and rotation period, we derived an inclination of $i = 55°$.

– *TYC 6878 0195 1*

Bw; $V - K_s = 2.904$ mag; $P = 5.70$ d

TYC 6878 0195 1 is a wide visual binary whose primary component is a K4Ve star at 1.1″ (∼88 AU) from the secondary (Torres et al. 2008) with a magnitude $V = 13.80$ mag (Mason et al. 2001). Torres et al. (2006), who first proposed the membership of this star in the association, reported $v \sin i = 9.8\,\mathrm{km\,s^{-1}}$. It is also considered member of the β Pictoris association by Pecaut & Mamajek (2013) and Elliott et al. (2014, 2015).
The rotation period $P = 5.70$ d was first determined by Messina et al. (2010), based on ASAS photometric time series. This period was subsequently confirmed by the analysis of SuperWASP time series by Messina et al. (2011).

– *2MASS J19233820-4606316*

S; $V - K_s = 3.598$ mag; $P = 3.237$ d

2MASS J19233820-4606316 is classified as M0V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 57$ pc. They associated this star with the X-ray source 1RXS J192338.2-460631, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -3.24$. The membership of the β Pictoris association was first proposed by Malo et al. (2013) and later by Malo et al. (2014a) as a high-probability member with a predicted distance $d = 70$ pc and a measured projected rotational velocity $v \sin i = 15.4 \pm 3\,\mathrm{km\,s^{-1}}$. Also Malo et al. (2014a) did not find evidence of significant RV variations. Moór et al. (2013) measured a kinematic distance $d = 71$ pc and identified it as a new probable candidate member of the association, measuring the same RV as Malo et al. (2013). Therefore, we consider it a single star.
The rotation period $P = 3.242$ d and V-band light curve amplitude $\Delta V = 0.11$ mag were measured by Kiraga (2012) by analyzing the ASAS photometric time series. We analyzed the SuperWASP time series of this target (1SWASP J192338.19-460631.5) and our LS and CLEAN periodograms confirmed the rotation period $P = 3.237 \pm 0.005$ d with a light curve amplitude $\Delta V = 0.07$ mag (see Fig. A.51). We derived a luminosity $L = 0.19 \pm 0.05\,L_\odot$, a radius $R = 0.92 \pm 0.30\,R_\odot$, and an inclination $i \sim 90°$.

– *2MASS J19243494-3442392*

Bc?; $V - K_s = 5.495$ mag; $P = 0.7072$ d

2MASS J19243494-3442392 is classified as M4V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 13 pc. They associated this star with the X-ray source 1RXS J192434.2-344230, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -3.27$. Malo et al. (2014b) found it to be a high-probability member with a predicted distance $d = 54$ pc and a projected rotational velocity $v \sin i = 10.9 \pm 2.9$ km s^{-1}. They obtained three RV measurements that exhibit a small but significant variability that point toward a binary nature of this star.
In 2015 we carried out a photometric monitoring of this object at the ROAD Observatory. Our LS and CLEAN analyses of the V and I time series revealed a rotation period $P = 0.7072 \pm 0.008$ d, an amplitude of the light curve ΔV = 0.02 mag and ΔI = 0.015 mag, and a positive correlation between the V and $V - I$ color variations (the star is redder when it is fainter; see Fig. A.52). We were able to retrieve a magnitude time series for this star (SSS_J192435.0-344240) from the CSS survey whose periodogram analysis provided a rotation period $P = 0.74 \pm 0.01$ d (see Fig. A.53). This target was also observed by SuperWASP (1SWASP J192434.97-344239.3). For this data the LS periodogram gives the highest periodicity at one day and a secondary period at $P = 0.678 \pm 0.005$ d (see Fig. A.54), which is in good agreement with the period found with our ROAD observations; whereas the CLEAN periodogram did not reveal any significant power peak.

– *TYC 7443 1102 1*

Tw; $V - K_s = 3.954$ mag; $P = 11.3$ d

TYC 7443 1102 1 is a M0.0V single star at a predicted distance of d = 57.7 pc and proposed by Lépine & Simon (2009), together with the common proper motion companion 2MASS J195602.8-320720 at an angular distance of ∼26.3″ (∼1450 AU), to be a member of the β Pictoris association (see, also Elliott et al. 2016). Also Kiss et al. (2011) found these two stars to have the same kinematic distances and radial velocities, confirming they are a physical pair in the association. They also suggested that this pair may be physically associated with the other member, 2MASS J20013718-3313139. A high-probability membership of both components is also found by McCarthy & White (2012), on the basis of Li EW, and by Malo et al. (2014b). This star has been investigated by Delorme et al. (2012) and Biller et al. (2013) to search for substellar mass companions, but no evidence has been found. Messina et al. (2011) reported for TYC 7443 1102 1 a rotation period of $P = 11.3$ d, which was found by LS and CLEAN periodograms in all the ASAS observation seasons and a period of $P = 11.8$ d in all the SuperWASP observation seasons. The rotation period $P = 11.3$ d combined with a stellar radius $R = 0.96\,R_\odot$ is in agreement with the rotational velocity $v \sin i = 6 \pm 2$ km s^{-1} measured by Lépine & Simon (2009).
We derived a luminosity $L = 0.16 \pm 0.03\,L_\odot$, a stellar radius $R = 0.94 \pm 0.09\,R_\odot$ and, in combination with the rotational velocity, we inferred $\sin i = 1.18 \pm 0.1$. This high value may arise from an underestimation of the stellar radius.

– *2MASS J19560294-3207186AB*

Tc; $V - K_s = 5.116$ mag; $P = 1.569$ d

2MASS J19560294-3207186AB is classified as M4V by Riaz et al. (2006) from the TiO-band strength. They associated this star with the X-ray source 1RXS J195602.8-320720, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -2.91$. Malo et al. (2014a) measured a projected rotational velocity $v \sin i = 35 \pm 4.9$ km s^{-1}. This star was discovered to be a close visual binary whose components have a separation $\rho = 0.2''$ (∼10 AU), an orbital period P = 66 yr (Bowler et al. 2015), and a magnitude difference ΔH = 1.22 mag. Together with TYC 7443 1102 1 and 2MASS J20013718-3313139, they form a hierarchical quadruple system.
The membership of the association was proposed by Lépine & Simon (2009), Kiss et al. (2011), and McCarthy & White (2012). This star was photometrically monitored at KKO. We detected with both LS and CLEAN analyses only one significant power peak at $P = 1.569 \pm 0.008$ d, which we attribute to the brighter A component (see Fig. A.55).

– *2MASS J20013718-3313139*

Tw; $V - K_s = 4.056$ mag; $P = 12.7$ d

2MASS J20013718-3313139 is classified as M1V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 48 pc. They associate this star with the X-ray source 1RXS J200136.9-331307, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -3.39$. Elliott et al. (2014) did not find evidence for multiplicity from their RV measurements. Kiss et al. (2011) first proposed it to be a likely member of the association at a distance $d = 62$ pc. Malo et al. (2013) also proposed this star as member with a probability of 99.9%. Kiss et al. (2011) suggested that this star is associated with TYC 7443 1102 1 since they found these two stars have the same kinematic distances and radial velocities, confirming they are a physical pair in the association. TYC 7443 1102 1 is itself associated with the visual close binary 2MASS J19560294-3207186AB. Malo et al. (2013, 2014a) measure an upper limit for the projected rotational velocity $v \sin i < 2.6$ km s^{-1} and find it a high probability member. Also Pecaut & Mamajek (2013) and Elliott et al. (2015) consider it a member of the association.
ASAS and SuperWASP photometric time series were analyzed by Messina et al. (2011) who found in all seasons a rotation period $P = 12.8 \pm 0.2$ d (ASAS) and 12.7 ± 0.2 d (SuperWASP), and a maximum light curve amplitude ΔV = 0.13 mag. Similar period $P = 12.77$ d was also found by Kiraga (2012) in the ASAS data. We derived a luminosity $L = 0.14 \pm 0.03\,L_\odot$, a radius $R = 0.89 \pm 0.09\,R_\odot$, and an inclination $i = 47 \pm 5°$.

– *2MASS J20055640-3216591 (V5663 Sgr)*

S; $V - K_s = 4.022$ mag; $P = 8.368$ d

Moór et al. (2013) assigned it a M2 spectral type on the basis of its effective temperature and suggested that this

star is a probable member of the association. They derived a kinematic distance d = 52 pc and detected no sign for multiplicity. Therefore, we consider it a single star. It is associated with the X-ray source 1RXS J200556.1-321651 with a X-ray to bolometric luminosity $L_X/L_{bol} = -3.56$.
This star was observed by SuperWASP in three seasons (1SWASP J200556.41-321658.6). Our LS and CLEAN analyses of this data allowed us to find the rotation period $P = 8.368 \pm 0.005$ d in both periodograms with a maximum light curve amplitude of ΔV = 0.13 mag (see Fig. A.56). Berdnikov & Pastukhova (2008) measured a similar rotation period P = 8.307 d analyzing the ASAS photometry time series. We derived a luminosity $L = 0.13 \pm 0.03\,L_\odot$ and a radius $R = 0.86 \pm 0.09\,R_\odot$.

– *HD 191089*

S+D; $V - K_s$ = 1.104 mag; P = 0.488 d

HD 191089 is a F5V single star first proposed by Barrado y Navascués et al. (1999) as member of the β Pictoris association. Subsequently, it was considered by Moór et al. (2006), Torres et al. (2008), Lépine & Simon (2009), and Malo et al. (2013) as a bona fide member. The star hosts a debris disk with T_{dust} = 95 K, R_{dust} = 15 AU, and $M_{dust} = 3.4 \times 10^{-2}\,M_\oplus$ (Rhee et al. 2007). The disk was recently spatially resolved by Churcher et al. (2011). The literature RVs show a modest scatter, which seems compatible with measurement errors. The projected rotational velocity was measured by Schröder et al. (2009) $v \sin i = 37.7$ km s^{-1} and by White et al. (2007) $v \sin i = 37.0$ km s^{-1}.
A tentative period P = 0.488 d is derived from the HIPPARCOS data analysis (Desidera et al. 2015). We derived a luminosity $L = 2.89 \pm 0.80\,L_\odot$, a radius $R = 1.35 \pm 0.10\,R_\odot$, and an inclination $i = 15 \pm 2°$.

– *2MASS J20100002-2801410AB*

Bc; $(V - K_s)$ = 4.64 mag; P = 0.4702 d

2MASS J20100002-2801410AB is classified as M3V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 26 pc. They associate this star with the X-ray source 1RXS J201001.0–280139, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -3.16$. Bergfors et al. (2010) observed this target in 2008.87 with the Lucky Imaging camera AstraLux Sur and discovered it is a close visual system consisting of M2.5 + M3.5 components that have a separation $\rho = 0.615''$ (∼16 AU), a position angle PA = 280.4°, and magnitude differences $\Delta z'$ = 0.80 mag and $\Delta i'$ = 0.75 mag. Janson et al. (2012) derived the following masses $M_A = 0.355\,M_\odot$ and $M_B = 0.245\,M_\odot$, a separation of 19.5 AU, and an orbital period of 157 yr. Malo et al. (2013) proposed this system to be member of the association with a probability of 99% and inferred a statistical distance d = 53 pc. Malo et al. (2014a) measured a projected rotational velocity $v \sin i = 46.5 \pm 4.1$ km s^{-1} and variable radial velocity, and they listed this star among the bona fide members of the association. This system was investigated by Riedel et al. (2014) who inferred a distance d = 48 pc from parallax measurements and deblended magnitudes V = 13.62 mag and I = 10.85 mag for the A component and V = 13.86 mag and I = 11.06 mag for the B component confirming the membership of the association. Their Hubble-FGS observations confirmed the separation $\rho = 0.614''$ and position angle PA = 281.6°.
This system was observed by SuperWASP in two seasons (1SWASP J201000.03-280140.7). Our LS and CLEAN periodogram analyses exhibit the most powerful peak at $P = 0.4702 \pm 0.0003$ d and other peaks, which are its beat periods. When we use the CLEAN periodogram, which effectively removes the aliasing effect arising from the spectral window, we find that the most powerful peak is at P = 0.470204 d (see Fig. A.57). No evidence of a second periodicity related to the other component is found.

– *2MASS J20333759-2556521*

S; $V - K_s$ = 5.993 mag; P = 0.71 d

2MASS J20333759-2556521 is classified as M4.5V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance d = 13 pc. They associate this star with the X-ray source 1RXS J203336.9-255654, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -3.15$. Its membership was first suggested by Malo et al. (2013) and then confirmed by Malo et al. (2014b) who listed it among the bona fide members of the association and measured a projected rotational velocity $v \sin i$ = 21 km s^{-1} and a high Li EW = 504 mÅ. Their multi-epoch RV measurements ruled out its binary nature. Membership was subsequently confirmed by Riedel et al. (2014).
Our LS and CLEAN analyses of SuperWASP data (1SWASP J203337.61-255651.7) allowed us to measure a photometric rotation period $P = 0.7097 \pm 0.0005$ d and a light curve amplitude ΔV = 0.05 mag (see Fig. A.58). We derived a luminosity $L = 0.037 \pm 0.009\,L_\odot$, a radius $R = 0.76 \pm 0.09\,R_\odot$, and an inclination $i = 23 \pm 3°$.

– *HIP 102141AB (AT Mic)*

Bc; $(V-K_s)_A = (V-K_s)_B$ = 5.416 mag; P = 1.19 d; P = 0.78 d

HIP 102141AB is a M4 + M4 close visual binary system ($\rho = 3.3''$; McCarthy & White 2012) (∼34 AU). The membership of the association was first proposed by Barrado y Navascués et al. (1999), and later by Zuckerman et al. (2001), Zuckerman & Song (2004), Torres et al. (2006), and Makarov (2007), Lépine & Simon (2009), Nakajima et al. (2010), and Riedel et al. (2014). Torres et al. (2006) reported $v \sin i_A$ = 10.1 km s^{-1} and $v \sin i_B$ = 15.8 km s^{-1} for the components A and B, respectively; whereas Scholz et al. (2007) determined $v \sin i_A$ = 10.56 km s^{-1} and $v \sin i_B$ = 17 km s^{-1}. The most recent photometric analysis of this system is presented by Messina et al. (2016a). Our analysis of the first season of SuperWASP data, allowed us to measure the stellar rotation periods of both components. Although the photometry could not resolve the system, both components equally contribute to the stellar variability, allowing an accurate period measurement. We find the rotation periods $P = 1.191 \pm 0.005$ d and $P = 0.781 \pm 0.002$ d. The period P = 0.781 d was also found by Kiraga & Stepien (2007) from the analysis of spatially unresolved ASAS data. The period P = 1.191 d was also retrieved by Messina et al. (2011) from the same SuperWASP photometry. For instance, the first determination reported by Messina et al. (2010) turned out to be the beat period of the faster component. For

AT Mic A we derived a luminosity $L = 0.034 \pm 0.01\,L_\odot$, a radius $R = 0.61 \pm 0.09\,R_\odot$, and an inclination $i \sim 25°$. For AT Mic B, we derived a luminosity $L = 0.031 \pm 0.01\,L_\odot$, a radius $R = 0.59 \pm 0.09\,R_\odot$, and the same inclination $i \sim 25°$.

– *2MASS J20434114-2433534*

Bc; $V - K_s = 4.971$ mag; $P = 1.61$ d

2MASS J20434114-2433534 is a close visual binary consisting of M3.7 + M4.1 components at a trigonometric distance $d = 28$ pc (Shkolnik et al. 2012) with separation $\rho = 1.47''$ (PA = 217°) (∼42 AU). Malo et al. (2014a) measured a projected rotational velocity $v \sin i = 26$ km s^{-1} (Malo et al. 2013, 2014a) and found it to be a highly probability member of the association. In earlier studies by Shkolnik et al. (2009, 2012) it was first identified as candidate member of the Castor moving group with an estimated age of about 200 Myr (or younger) with quality match BAA.
Our LS analysis of SuperWASP data (1SWASP J204341.16-243352.8) allowed us to measure the photometric rotation period $P = 1.61 \pm 0.01$ d and a V-band light curve amplitude $\Delta V = 0.04$ mag, whereas the CLEAN algorithm found only one major power peak at one day (see Fig. A.59).

– *HIP 102409 (AU Mic)*

S+D; $V - K_s = 4.201$ mag; $P = 4.86$ d

HIP 102409 is a M1Ve (Maldonado et al. 2015) single star (Bailey et al. 2012). The SEEDS images do not detect any companions within 3.2″, ∼30 AU projected (Brandt et al. 2014). It hosts a well-known debris disk that appears nearly edge-on and extends out to 200 AU in radius (Kalas et al. 2004). The membership of the association was first proposed by Barrado y Navascués et al. (1999), and later by Zuckerman et al. (2001), Zuckerman & Song (2004), Torres et al. (2006), Makarov (2007), Lépine & Simon (2009), and confirmed in several subsequent studies. Weise et al. (2010) reported $v \sin i = 8.2$ km s^{-1}; Browning et al. (2010) $v \sin i < 8.5$ km s^{-1}; Scholz et al. (2007) $v \sin i = 8.49$ km s^{-1}; and Torres et al. (2006) $v \sin i = 9.3$ km s^{-1}.
The rotation period $P = 4.865$ d was discovered by Torres & Ferraz Mello (1973). A new determination $P = 4.854$ d was performed by Busko & Torres (1978). A period $P = 4.852$ d is reported by Kiraga (2012) and $P = 4.822$ d is listed in ACVS. A period $P = 4.837$ d is found by Hebb et al. (2007). Our LS and CLEAN analyses find $P = 4.86$ d from ASAS, $P = 4.83$ d from SuperWASP time series, and $P = 4.890$ d from Hipparcos data. We derived a luminosity $L = 0.105 \pm 0.03\,L_\odot$, a radius $R = 0.82 \pm 0.08\,R_\odot$, and an inclination $i = 80 \pm 10°$.

– *HIP 103311*

Bc; $V - K_s = 1.539$ mag; $P = 0.3558$ d

HIP 103311 is a close visual binary consisting of a F8V + M0V at 1.1″ (∼49 AU) (Kaisler et al. 2004). Its membership to the association was proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), Torres et al. (2006), Lépine & Simon (2009), and later confirmed by other studies. It is one of the fastest rotating members: $v \sin i = 115.5$ km s^{-1} was measured by García-Alvarez et al. (2011); $v \sin i = 127.5$ km s^{-1} by Torres et al. (2006); and $v \sin i = 160$ km s^{-1} by Weise et al. (2010).
The stellar rotation period $P = 0.3558$ d was first determined by Messina et al. (2010) and subsequently confirmed by García-Alvarez et al. (2011) who inferred a radius $R = 2.20\,R_\odot$ and an inclination $i = 21°$.

– *TYC 6349 0200 1 (AZ Cap)*

Bw; $V - K_s = 3.541$ mag; $P = 3.40$ d

TYC 6349 0200 1 is a wide visual binary consisting of K6Ve + M2 components at 2.2″ (∼105 AU) and with a magnitude difference $\Delta K = 1.6$ mag (Neuhauser et al. 2002, 2003). The system has the same proper motion as HIP 103311 and is located nearby, therefore that it most certainly has the same distance as HIP 103311 (van den Ancker et al. 2000; Elliott et al. 2016). Its membership was proposed by Zuckerman et al. (2001), Zuckerman & Song (2004), Torres et al. (2006), and Lépine & Simon (2009). The value $v \sin i = 15.6$ km s^{-1} is reported by Torres et al. (2006); $v \sin i = 14.6$ km s^{-1} by Jayawardhana et al. (2006); $v \sin i = 12$ km s^{-1} by de la Reza & Pinzón (2004), and $v \sin i = 20 \pm 2$ km s^{-1} by Lépine & Simon (2009).
Messina et al. (2010) found a period $P = 3.4$ d from the ASAS photometry analysis. A period $P = 3.403$ d is subsequently reported by Kiraga (2012) based on the same ASAS photometry, where the two components are unresolved. Similar period $P = 3.4082$ is listed in ACVS. We derived a luminosity $L = 0.28 \pm 0.08\,L_\odot$, a radius $R = 1.11 \pm 0.10\,R_\odot$, and an inclination $i = 70 \pm 10°$.

– *2MASS J21100535-1919573*

S; $V - K_s = 4.344$ mag; $P = 3.71$ d

2MASS J21100535-1919573 is classified as M2V by Riaz et al. (2006) from the TiO-band strength at a spectroscopic distance $d = 24$ pc. They associate this star with the X-ray source 1RXS J211004.9−192005, which exhibits strong X-ray to bolometric luminosity $L_X/L_{bol} = -2.99$. The RV measurements by Malo et al. (2013, 2014a) and Moór et al. (2013) do not differ significantly, indicating it is likely a single star. Its membership to the β Pictoris association was investigated by Moór et al. (2013) who found the Galactic space motion to be consistent with those of other association members. However, their measured Li EW upper limit ($EW_{Li} < 40$ mÅ) did not enable the application of their age diagnostics. Malo et al. (2013, 2014a) confirmed it as a high-probability candidate member and measured $v \sin i = 9.7 \pm 1.2$ km s^{-1} and a predicted distance $d = 32$ pc. Also Elliott et al. (2016) found it was a member.
This star was observed by ASAS with a photometric precision $\sigma = 0.024$ mag. Considering this data, our LS and CLEAN periodogram analyses allowed us to find a rotation period $P = 3.71 \pm 0.02$ d in the complete series as well as in its yearly seasons with a maximum light curve amplitude of $\Delta V = 0.29$ mag. This star was also observed in the NSVS (ID 17204671) from June to October 1999 with a better photometric precision $\sigma = 0.011$ mag. Our LS and CLEAN periodogram analyses allowed us to find the same rotation period $P = 3.71 \pm 0.05$ d with a light curve amplitude of

ΔV = 0.09 mag (see Fig. A.60). In addition, we observed this target at CASLEO from September 3 untill October 22, 2014 for a total of nine nights. Our LS analysis revealed a period $P = 3.71 \pm 0.01$ d with high confidence level and an amplitude ΔR = 0.26 mag. The CLEAN algorithm revealed its beat period at P = 0.78 d as its most significant peak (see Fig. A.61). However, it would mean an inclination $i < 10°$, and in contrast with the high amplitude of light variation. We derived a luminosity $L = 0.09 \pm 0.025\,L_\odot$, a radius $R = 0.79 \pm 0.08\,R_\odot$, and an inclination $i = 73 \pm 7°$.
Among the single members of the association, this star exhibits a different behavior. Although it is the fastest star among four equal-mass stars ($V - I$ = 1.97–2.00) in our sample, it shows the smallest content of lithium. On the contrary, we generally observe a positive correlation between Li content and rotation rate (see Messina et al. 2016c). Moreover, this star exhibits a light curve amplitude that is significantly larger than the average observed among the other β Pictoris members.

– *2MASS J21103147-2710578 and 2MASS J21103096-2710513*

Bw; $V - K_s$ = 5.60 mag; P = 1.867 d

This is a visual binary consisting of two M-type components at an angular distance of 9.5″ (~390 AU). Riaz et al. (2006) inferred a M4.5V spectral type from the TiO-band strength and a spectroscopic distance d = 16 pc for the primary component J21103147-2710578, and a M5V spectral type and a spectroscopic distance d = 22 pc for the secondary component J21103096-2710513. Both components, owing to their small angular separation, are associated with the same X-ray source 1RXS J211031.2–271046. Their X-ray to bolometric luminosities are L_X/L_{bol} = −3.00 for the primary and L_X/L_{bol} = −2.66 for the secondary (Riaz et al. 2006). A first position measurement was made by Cutri et al. (2003) who found a separation ρ = 9.4″ and a position angle PA = 313°. Subsequently, this visual binary was observed with the Lucky Imaging camera AstraLux Sur that measured ρ = 9.501″ (152 AU), position angle PA = 313.2°, and magnitude differences $\Delta z'$ = 1.07 mag and $\Delta i'$ = 1.20 mag (Bergfors et al. 2010). In their study, Bergfors et al. (2010) noticed that the two components form a common proper motion pair. The components of this system were proposed as candidate members of the β Pictoris association by Malo et al. (2013) who inferred a membership probability of 99.9%, a statistical distance d = 41 pc, and a projected rotational velocity for the primary component of $v \sin i$ = 15.8 ± 1.3 km s^{-1} and $v \sin i$ = 14.6 ± 2.4 km s^{-1} for the secondary (Malo et al. 2014a). Membership was confirmed by Malo et al. (2014a,b).
This system was observed photometrically by SuperWASP (1SWASP J211031.38-271056.7) in two consecutive seasons. Owing to low angular resolution, both components were included in the aperture photometry. Our LS and CLEAN analyses detected a rotation period $P = 0.650 \pm 0.007$ d in the complete series and in the first season. Owing to the faintness of the star, the achieved average photometric precision σ = 0.14 mag is very poor, whereas the light curve amplitude is ΔV = 0.04 mag. We note the presence of a secondary peak at P = 1.867 d in the LS periodogram, which is the 1-d beat period, and it is removed by CLEAN (see Fig. A.62). For the primary, we derived a luminosity $L = 0.017 \pm 0.005\,L_\odot$, a radius $R = 0.47 \pm 0.05\,R_\odot$, and $i = 26 \pm 3°$.

– *HIP 105441 (V390 Pav) and TYC 9114 1267 1*

Bw; $(V - K_s)_A$ = 2.370 mag; $(V - K_s)_B$ = 3.581 mag; P_A = 5.50 d; P_B = 20.5 d

This is a visual binary consisting of K2V + K7V components separated by 26″ (~785 AU). The primary component A, designed as V390 Pav in the 74th special name-list of variable stars (Kazarovets et al. 1999), was proposed by Zuckerman et al. (2001) as a possible member of the Tucana association. Subsequently, Ortega et al. (2009) proposed it as a dynamical member of the β Pictoris association.
Torres et al. (2006) did not detect the presence of the Li line. The Li line was not detected also by Song et al. (2003). Doubts on the membership has also been raised by Elliott et al. (2016) since the position of the primary in the $M_V - T_{eff}$ diagram is below the 24-Myr isochrone that fits the other members of the β Pictoris association. This circumstance suggests that HIP 105441 may be older.
Kiraga (2012) reported for the primary component a rotation period P = 5.30 d and a light curve amplitude ΔV = 0.05 mag. We derived a luminosity $L = 0.32 \pm 0.09\,_\odot$, a radius $R = 0.80 \pm 0.11\,R_\odot$, and an inclination $i = 53 \pm 5°$.
The secondary component B was first proposed as a member of the β Pictoris association by Torres et al. (2006) who measured a $v \sin i$ = 4.5 ± 1.2 km s^{-1}. Its membership was questioned by da Silva et al. (2009) who considered it as an intruder, owing to its very low Li content (EW_{Li} = 15 mÅ), and its membership was also rejected by Schlieder et al. (2010). We derived a luminosity $L = 0.11 \pm 0.03\,L_\odot$, a radius $R = 0.71 \pm 0.23\,R_\odot$ for component B. Malo et al. (2013) found this system to be a high-probability member of the association. They inferred a statistical distance d = 32 pc for the secondary component TYC 9114-1267-1, which is in fair agreement with the trigonometric distance d = 30.2 pc inferred by van Leeuwen (2007). However, the RV measurements in the literature are uncertain and exhibit large scatter, which suggests that the primary component may be an unresolved spectroscopic binary (Torres et al. 2006).
Both stars were observed at KKO from October 10 until December 1, 2014 for a total of 24 nights and at CASLEO from September 4 until October 20, 2014 for a total of 9 nights. From this data, we derived the rotation period $P = 5.50 \pm 0.02$ d for V390 Pav (see Fig. A.63) and P = 20.5 ± 1. d for TYC 9114 1267 1 (see Fig. A.64). In the latter case, the rotation period is however in disagreement with the projected rotational velocity and stellar radius; the expected period should be $P < 8$ d. The disagreement may derive from distance. In this case the star should be more distant than d = 32 pc and, therefore, have a larger radius. However, both stars seem to have the same proper motions and are likely be physically bound at the trigonometric distance measured from V390 Pav.

– *TYC 9486 927 1*

Bc; $V - K_s$ = 4.36 mag; P = 0.54 d

TYC 9486 927 1 is a M1V star with uncertain single/binary nature and a projected rotational velocity $v \sin i$ = 43.5 ± 1.2 km s^{-1} (Torres et al. 2006). The membership was

proposed by Torres et al. (2006), and then TYC 9486 927 1 was considered a candidate member by Malo et al. (2013) and proposed to be member of the Carina association by Elliott et al. (2015). A recent study by Deacon et al. (2016) concludes that this is likely a single star and suggests membership to the β Pictoris association.
Kiraga (2012) measured a photometric rotation period P = 0.5419 d and a peak-to-peak light curve amplitude ΔV = 0.19 mag.

– *2MASS J21374019+0137137AB*

Bc; $V - K_s$ = 5.476 mag; P = 0.201 d

2MASS J21374019+0137137AB is a M5V star (Mochnacki et al. 2002) at a predicted distance d = 39 pc (Schlieder et al. 2012). This is a highly active star that exhibits strong X-ray, NUV, and FUV emission, and a fast rotation rate of $v \sin i$ = 55 km s^{-1} (Mochnacki et al. 2002), $v \sin i$ = 45 ± 5 km s^{-1} (Schlieder et al. 2012), and $v \sin i$ = 66 ± 9 km s^{-1} (Malo et al. 2014a). The available RV measurements show evident variability that is, however, attributed to uncertainties arising from fast rotation. We retrieved one spectrum in the 3800–9000 Å region from the LAMOST spectroscopic survey archive. From our analysis, we inferred a M7V spectral type and detected the Hα line in emission with EW = −10.1 ± 0.6 Å (Zhang et al. 2016).
It was discovered by Bowler et al. (2015) to be a close visual binary with components separated by ρ = 0.44″ (∼17 AU), magnitude difference ΔK_s = 0.8 mag, and orbital period of 40 yr. This star was proposed by Schlieder et al. (2012) and by Malo et al. (2014b) as a likely member of the β Pictoris association.
Kiraga (2012) measured a rotation period P = 0.213086 d based on the ASAS photometry. This star was also observed by NSVS (ID 14441065) and our LS analysis revealed a period P = 0.2037 d (P = 0.1932 d from CLEAN periodogram; see Fig. A.65). We also observed this target at CASLEO from September 4 untill October 20, 2014 for a total of nine nights. Our LS analysis revealed a period P = 0.2015 ± 0005 d in agreement with ASAS and NSVS determinations, and an amplitude ΔR = 0.13 mag (see Fig. A.66).

– *2MASS J21412662+2043107*

Bc?; $V - K_s$ = 4.891 mag; P = 0.899 d

2MASS J21412662+2043107 is a M3V star (Alonso-Floriano et al. 2015). It was suggested to be a high-probability member of the β Pictoris association by Schlieder et al. (2012) at a kinematic distance d = 52.7 pc. We retrieved one spectrum in the 3800-9000 Å region from the LAMOST spectroscopic survey archive. We inferred a M3V spectral type and detected the Hα line in emission with EW = −1.35 ± 0.02 Å from our analysis.
No multiple RV measurements are available to assess its single/binary nature.
Our LS and CLEAN analyses of SuperWASP data (ID 1SWASP J214126.63+204311.0) allowed us to measure with very high confidence level a photometric rotation period P = 0.899 ± 0.001 d with an amplitude of the light curve ΔV = 0.03 mag, and a second period P = 8.94 ± 0.02 d with lower power, but it is still highly significant (see Fig. A.67). The second period is close to but different than the 1-d beat periods. In fact, the CLEAN periodogram, which effectively removes such aliases, also exhibits this second period. Then, we may suspect that this star is an unresolved close binary and the detected rotation periods refer to the two components. No projected rotational velocity has been measured to infer the inclination of the rotation axis.

– *TYC 2211 1309 1*

Bc; $V - K_s$ = 3.666 mag; P = 1.109 d

TYC 2211 1309 1 is a M0Ve star at a predicted distance d = 45.6 pc (Lépine & Simon 2009). Lépine & Simon (2009) found this star to be magnetically active (the Hα line was found in emission) and measured a projected rotational velocity $v \sin i$ = 30 ± 2 km s^{-1}. This star is associated with the X-ray source 1RXS J220042.0+271520 and it was identified by Fuhrmeister & Schmitt (2003) as a variable X-ray source with flaring behavior. Lépine & Simon (2009) identified this star as a highly probable member of the β Pictoris association. However, McCarthy & White (2012) found no evidence of lithium, suggesting it is much older. Brandt et al. (2014) found no optical companions and assigned a lower probability membership (50%) to it because of the mentioned lack of lithium. We retrieved one spectrum in the 3800–9000 Å region from the LAMOST spectroscopic survey archive. From our analysis, we inferred a M0V spectral type and detected the Hα line in emission with EW = −1.52 ± 0.08 Å.
In the literature, we found two values of RV as follows: −13.3 ± 2.4 km s^{-1} from Lépine & Simon (2009), −0.3 ± 0.5 km s^{-1} from Malo et al. (2014a), and a new value RV = 27.2 km s^{-1} from the LAMOST spectrum, which are significantly different, indicating this star may be a binary system.
Norton et al. (2007) find a rotation period P = 0.5235 d based on the first SuperWASP season. A similar period P = 0.476 d is reported by Messina et al. (2010) based on the unique ASAS 2002 observation season. Messina et al. (2011) analyzed all three SuperWASP seasons and reported a rotation period P = 0.5229 d. However, we note that in all periodograms there is a peak at P = 1.109 d that has the same (and in a few seasons a larger) power as the quoted period P = 0.52 d.
Since we do not know the real single/binary nature, we can only make an estimate of the luminosity $L = 0.13 \pm 0.04\,L_\odot$ and a radius $R = 0.78 \pm 0.07\,R_\odot$. In the case of P = 0.52 d, we infer an inclination i = 23 ± 4°, whereas, in the case of P = 1.10 d, we infer an inclination i = 57 ± 5°. Owing to the very large amplitude of the light curve (ΔV = 0.10 mag), the longer period (and higher inclination) seems to be more likely. In this case, the star may have two major active regions at opposite hemispheres that modulate the observed flux with half the rotation period.

– *TYC 9340 0437 1 (CPD−72 2713)*

S; $V - K_s$ = 3.706 mag; P = 4.46 d

TYC 9340 0437 1 is classified as K7Ve by Torres et al. (2006) at a distance $d = 36$ pc. Biller et al. (2013) and Elliott et al. (2014) did not find evidence for binarity from RV measurements. Torres et al. (2006) and Weise et al. (2010) reported $v \sin i = 7.5$ km s^{-1} and $v \sin i = 6.6$ km s^{-1}, respectively. The membership of the β Pictoris association was proposed by Torres et al. (2006), Lépine & Simon (2009), Malo et al. (2014b), and Brandt et al. (2014).
Messina et al. (2010), using LS and CLEAN periodograms, found the rotation period $P = 4.46$ d in eight out of nine seasons of ASAS photometry. The same period was subsequently found by Kiraga (2012).
We derived a luminosity $L = 0.17 \pm 0.05\, L_\odot$, a radius $R = 0.91 \pm 0.08\, R_\odot$, and an inclination $i = 45 \pm 4°$.

– *HIP 112312 (WW Psa)*

Bw; $V - K_s = 5.168$ mag; $P = 2.37$ d

WW Psa is a M4Ve star with a fainter visual companion TX Psa at about $\rho = 33''$ (~780 AU). The membership of the β Pictoris association was first proposed by Song et al. (2003), and later by Zuckerman & Song (2004) and Torres et al. (2006). Torres et al. (2006) reported $v \sin i = 12.1$ km s^{-1}; Jayawardhana et al. (2006) reported $v \sin i = 14 \pm 1.73$ km s^{-1}.
Our analysis of ASAS (ASAS J224458-3315.1) and SuperWASP (1SWASP J224457.83-331500.6) data shows $P = 2.35$ d to be the rotation period. $P = 2.358$ d is reported by Kiraga (2012), and $P = 2.3546$ d is listed in ACVS. We observed WW Psa at Siding Spring Observatory (Australia), at CASLEO, and at the PEST Observatory, and measured a rotation period $P = 2.37 \pm 0.01$ d. The results of our analyses are reported by Messina et al. 2017. Adopting a distance $d = 23.6$ pc (from HIPPARCOS), we inferred a luminosity $L = 0.059 \pm 0.005\, L_\odot$, a stellar radius $R = 0.82 \pm 0.08\, R_\odot$, and an inclination of the stellar rotation axis $i \simeq 43 \pm 7°$.

TX Psa

Bw; $V - K_s = 5.567$ mag; $P = 1.080$ d

TX Psa is a M5Ve single star that is the fainter optical companion of WW Psa (Torres et al. 2008). The membership of the β Pictoris association was first proposed by Song et al. (2003), and later by Zuckerman & Song (2004) and Torres et al. (2006). Torres et al. (2006) report $v \sin i = 16.8$ km s^{-1}; Jayawardhana et al. (2006) report $v \sin i = 24.3 \pm 4.93$ km s^{-1}. Unfortunately, both ASAS and SuperWASP aperture photometry are often contaminated by the flux coming from the brighter WW Psa. We observed it at Siding Spring Observatory (Australia), at CASLEO, and at the PEST Observatory, and measured a rotation period $P = 1.086 \pm 0.005$ d. The results of our analyses are reported by Messina et al. 2017. We assume for TX Psa the same distance $d = 23.6$ pc as for WW Psa. We inferred a luminosity $L = 0.027 \pm 0.006\, L_\odot$ and a stellar radius $R = 0.59 \pm 0.09\, R_\odot$. We inferred the inclination of the stellar rotation axis $i \simeq 48 \pm 7°$ from these values and stellar rotation period.
Therefore, the two components of this physical pair are found to have similar inclinations of their rotation axes.

– *2MASS J22571130+3639451*

S; $(V - K_s) = 3.862$ mag; $P = 1.22$ d

2MASS J22571130+3639451 is a M3V star and proposed as likely member of the β Pictoris association at a distance $d = 68.7$ pc (Schlieder et al. 2012). They measured a projected rotational velocity $v \sin i = 20 \pm 2$ km s^{-1} and inferred a M3 spectral type, which was later confirmed by Frith et al. (2013). However, they found a discrepancy between the observed and predicted RV, that led them to change their minds about this membership.
We retrieved one spectrum in the 3800−9000 Å region from the LAMOST spectroscopic survey archive. We detected the Hα line in emission with $EW = -2.13 \pm 0.08$ Å from our analysis.
We retrieved a time series from the SuperWASP archive (1SWASP J225712.91+363928.2). However, the photometry is contaminated by a nearby star ($\Delta J = 1.8$ mag fainter) whose dilution effect determines a smaller amplitude of photometric variability. We determined with both LS and CLEAN periodograms a photometric rotation period $P = 1.22 \pm 0.01$ d with very high confidence level and a light curve amplitude $\Delta V = 0.04$ mag (see Fig. A.68). Adopting a distance $d = 68.7$ pc, we derived a luminosity $L = 0.12 \pm 0.03\, L_\odot$, a radius $R = 0.80 \pm 0.08\, R_\odot$, and an inclination i ~$37 \pm 7°$.

– *TYC 5832 0666 1 (BD–13 6424)*

S; $V - K_s = 3.971$ mag; $P = 5.68$ d

TYC 5832 0666 1 is classified as M0V by Riaz et al. (2006), M0.8V by Shkolnik et al. (2009), and M0Ve by Torres et al. (2006). Torres et al. (2006), Lépine & Simon (2009), Weise et al. (2010), and Malo et al. (2014a) measure similar values of projected rotational velocities, $v \sin i = 8.8$ km s^{-1}, $v \sin i = 7 \pm 2$ km s^{-1}, $v \sin i = 9.6$ km s^{-1}, and $v \sin i < 9$ km s^{-1}, respectively. Riaz et al. (2006) measured a spectroscopic distance $d = 25$ pc, whereas Lépine & Simon (2009) a kinematic distance $d = 27.3 \pm 0.4$ pc. No evidence for binarity is found either by the Lucky Imaging survey (Bergfors et al. 2010) nor by Delorme et al. (2012) or by Brandt et al. (2014) or from RV measurements (Malo et al. 2013; Elliott et al. 2014; Torres et al. 2006). All these studies indicate that it is a single star. The membership of the β Pictoris association was proposed by Torres et al. (2006), Shkolnik et al. (2009), Lépine & Simon (2009), Malo et al. (2014b), Brandt et al. (2014), and Elliott et al. (2015).
Messina et al. (2010) found the rotation period $P = 5.68$ d in five out of eight ASAS seasons. Similar periods $P = 5.667$ d and $P = 5.6945$ d are reported by Kiraga (2012) and in the ACVS, respectively. We derived a luminosity $L = 0.13 \pm 0.04\, L_\odot$ and a radius $R = 0.86 \pm 0.8\, R_\odot$, and an inclination $i = 90 \pm 15°$ considering $P = 5.68$ d.

– *2MASS J23500639+2659519*

Bc?; $V - K_s = 4.957$ mag; $P = 0.287$ d

2MASS J23500639+2659519 is classified as M3.5V by Riaz et al. (2006), Malo et al. (2014a), and by Shkolnik et al. (2009). Whereas Riaz et al. (2006) reported a spectroscopic

distance $d = 47 \pm 3$ pc, Reid et al. (2007) and Malo et al. (2013) determined similar values of photometric distances $d = 26.6 \pm 4$ pc, and $d = 24 \pm 2$ pc, respectively. On the other hand, Shkolnik et al. (2012) inferred a possible membership to the Castor Moving Group with match quality BAA. We have included this target in the present study since Malo et al. (2013) reported a probability that this target is member of the β Pictoris association of 92.8% when the star is assumed to be a binary, and 61.6% when it is assumed to be a single star. Subsequently, Malo et al. (2014a) redetermined the probability that it is a member of the β Pictoris association to 82.4%, which increases to 96.8% including radial velocity information. Klutsch et al. (2014) found it to be a likely member of the 200 Myr Castor MG. We obtained the first RV measurement for this target, RV = 0.4 ± 0.6 km s^{-1}, and $v \sin i$ = 36 km s^{-1} from ESPaDOnS spectra (Malo et al. in prep.).
This target was observed by SuperWASP (1SWASP J235006.40+265952.1) in two seasons (2004 and 2006). We selected only the higher precision data ($\sigma < 0.05$ mag) and searched for periodicities in both seasons with the LS and CLEAN periodograms. With both methods, we found a very significant (FAP < 0.1%) power peak at the period $P = 0.259 \pm 0.002$ d, which we consider the stellar rotation period and an amplitude of the light curve up to ΔV = 0.05 mag (see Fig. A.69). The average photometric precision is $\sigma = 0.040$ mag. This target was also observed by MEarth (Berta et al. 2012) with a higher photometric precision (σ = 0.003 mag). From this data we found a similar period P = 0.287 ± 0.005 d (see Fig. A.70).

– *2MASS J23512227+2344207* (G 68-46)

S; $V - K_s = 5.285$ mag; $P = 3.20$ d

2MASS J23512227+2344207 is classified as M4V by Riaz et al. (2006) and Shkolnik et al. (2009) who reported similar spectroscopic and photometric distances, $d = 15 \pm 3$ pc and $d = 14$ pc, respectively. A more recent spectroscopic distance $d = 18$ pc was measured by Newton et al. (2014), whereas Malo et al. (2014a) inferred a statistical distance $d = 16$ pc. Shkolnik et al. (2012) did not detect RV variations and inferred a possible membership of the Chamaeleon-Near Moving Group (MG) with match quality BBB and an estimated age in the range 35–300 Myr. Malo et al. (2013; 2014a,b) found a probability that the target is member of the β Pictoris association of 81.6%, which increases to 97.8% when the radial velocity information is included. On the other hand, the most recent investigation by Bowler et al. (2015) does not find any match with any young MG, suggesting an age in the range 35−300 Myr, in agreement with Shkolnik et al. (2009). However, Klutsch et al. (2014) found this star to be likely a member of the 200 Myr Castor MG. The membership of the β Pictoris association has been recently rejected by Binks & Jeffries (2016).
This target was included in the following three photometric surveys: SuperWASP (ID 1SWASP J235122.30+234421.2), the NSVS (ID 6277459), and the MEarth survey (ID LSPMJ2351+2344_tel08_2011-2013). In all three time series our LS and CLEAN periodograms found a highly significant (FAP < 0.1%) power peak at the period $P = 3.2079 \pm 0.0039$ d, which we consider the stellar rotation period, and we found light curve amplitudes up to ΔV = 0.06 mag (see Figs. A.71, A.72). The LS periodogram of the MEarth time series, which is the most accurate, shows two other power peaks at $P = 1.4$ d and $P = 0.7$ d. These peaks are alias of the rotation period and arise from the sampling interval of about 1 day imposed by the rotation of the Earth and the fixed longitude of the observation site. These peaks are effectively removed by the CLEAN algorithm (see Fig. A.73). We obtained one RV measurement, RV = -2.0 ± 0.3 km s^{-1}, which is comparable with the literature values, and $v \sin i = 4$ km s^{-1} from ESPaDOnS spectra (Malo et al., in prep.).
Adopting a distance $d = 18$ pc, we inferred a luminosity $L = 0.006 \pm 0.001\, L_\odot$, a stellar radius $R = 0.25 \pm 0.08\, R_\odot$, and an inclination $i = 83 \pm 15°$.

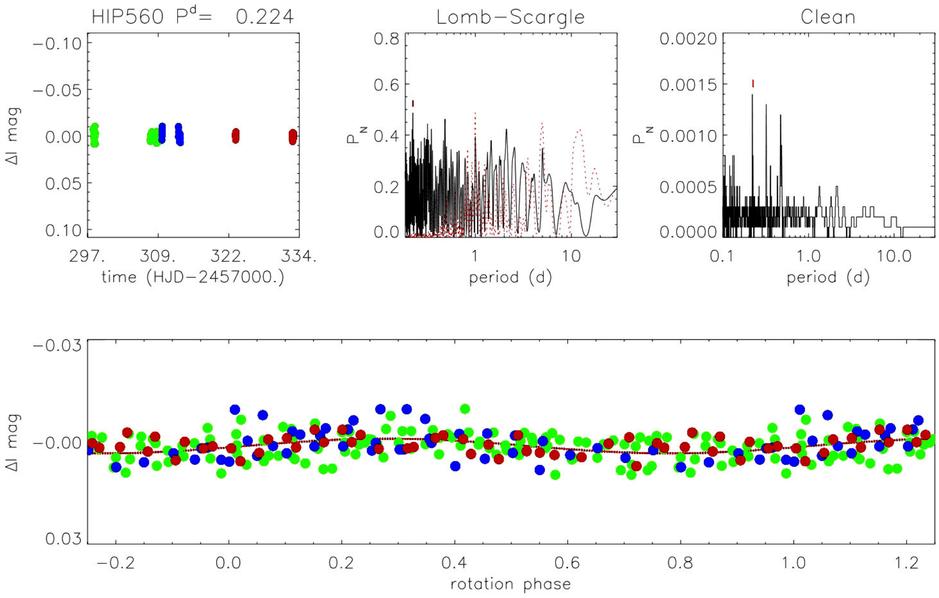

Fig. A.1. Results of periodogram analysis of HIP 560 with data collected at YSVP Observatory. In the *top left panel* we plot magnitudes vs. heliocentric Julian Day. Different colors are used to distinguish data collected on different segments of the observing run. In the *top middle panel* we plot the Lomb-Scargle periodogram with the spectral window function (red dotted line) and power level corresponding to FAP = 1% (horizontal dashed line) overplotted, and we indicate the peak corresponding to the rotation period. In the *top right panel* we plot the CLEAN periodogram. In the *bottom panel* we plot the light curve phased with the rotation period. The solid line represents the sinusoidal fit.

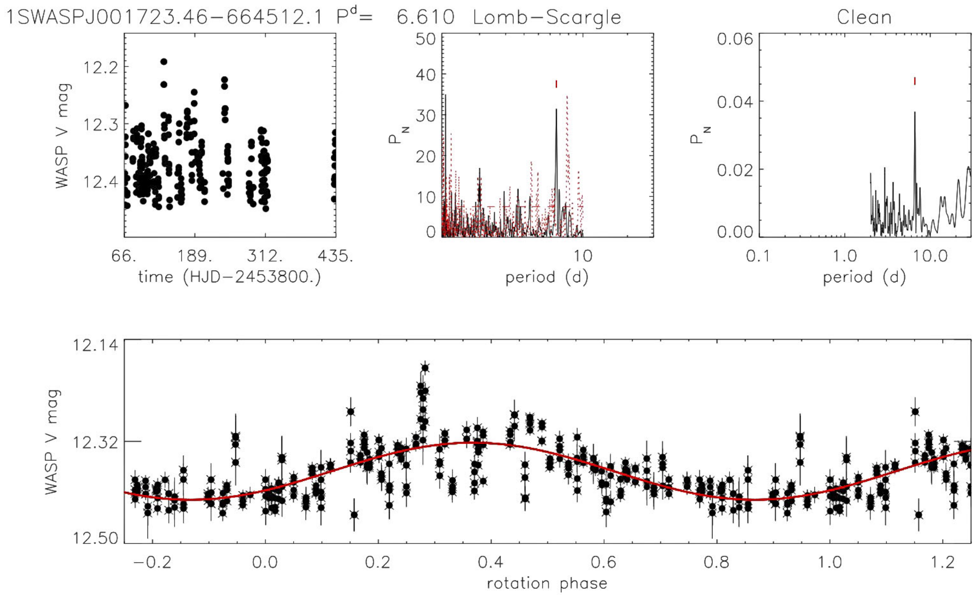

Fig. A.2. Same as in Fig. A.1 but for 2MASSJ00172353-6645124 with data collected by SuperWASP.

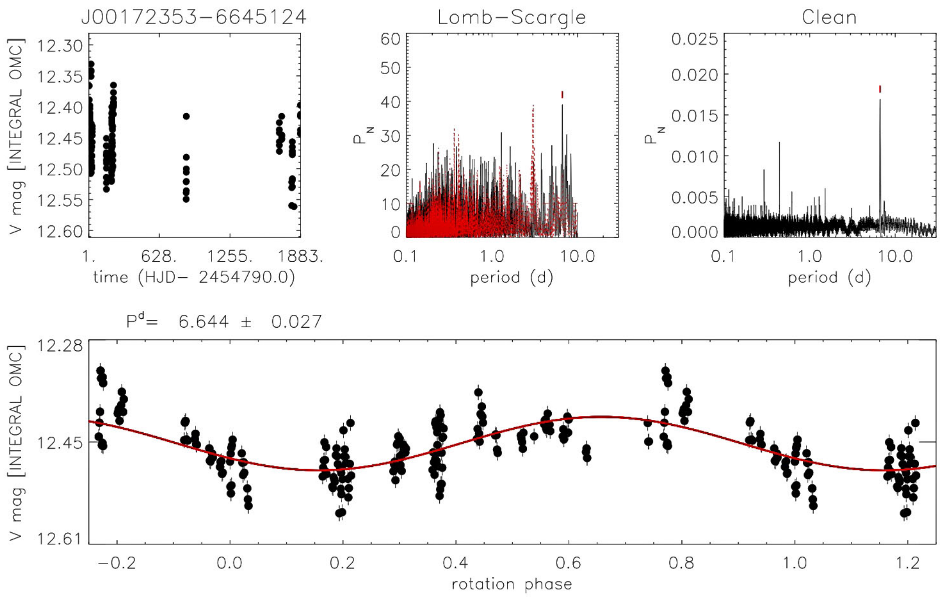

Fig. A.3. Same as in Fig. A.1 but for 2MASSJ00172353-6645124 with data collected by INTEGRAL/OMC.

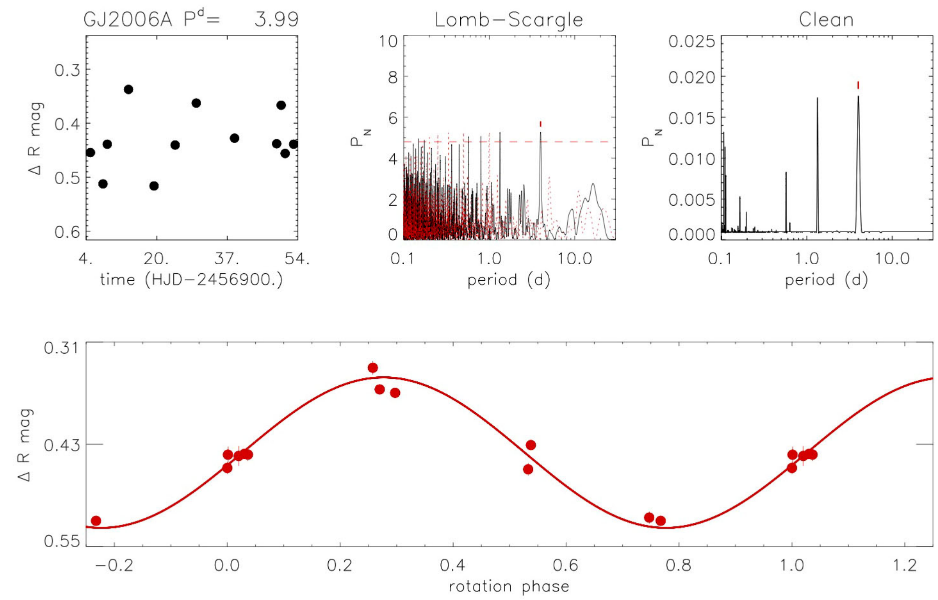

Fig. A.4. Same as in Fig. A.1 but for GJ 2006A with data collected at CASLEO.

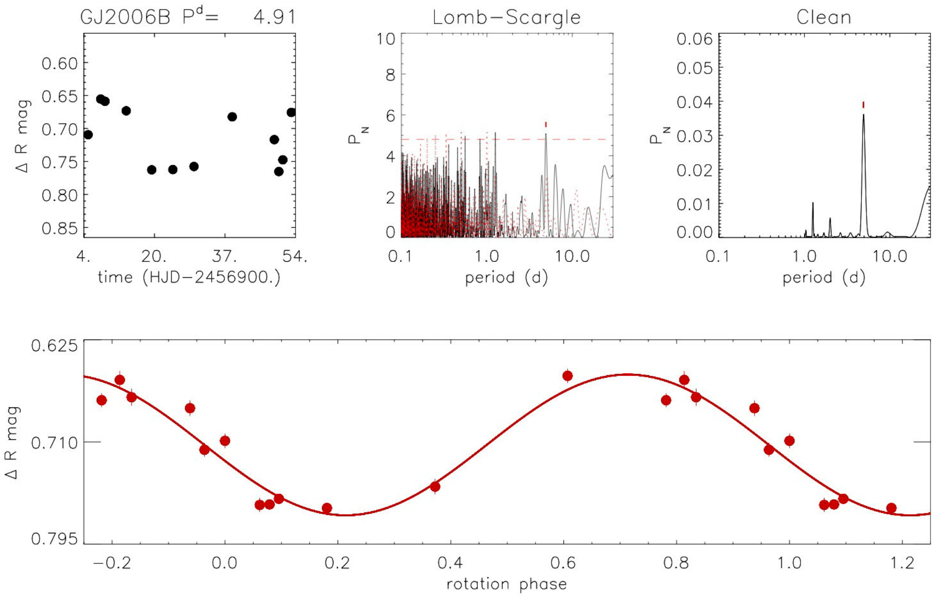

Fig. A.5. Same as in Fig. A.1 but for GJ 2006B with data collected by CASLEO.

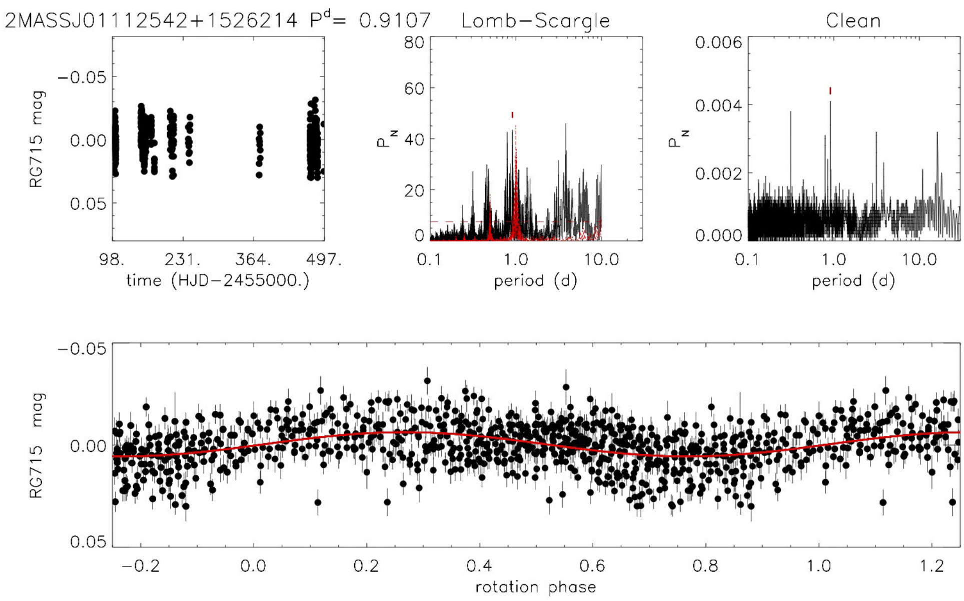

Fig. A.6. Same as in Fig. A.1 but for 2MASS J01112542+1526214 with data collected by MEarth.

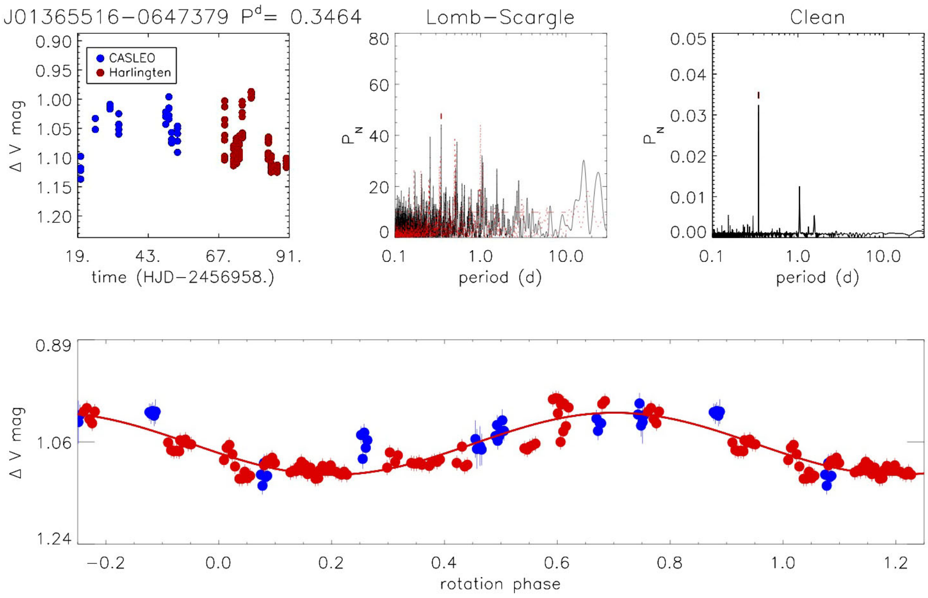

Fig. A.7. Same as in Fig. A.1 but for 2MASS J01365516-0647379 with data collected at CASLEO and HAO.

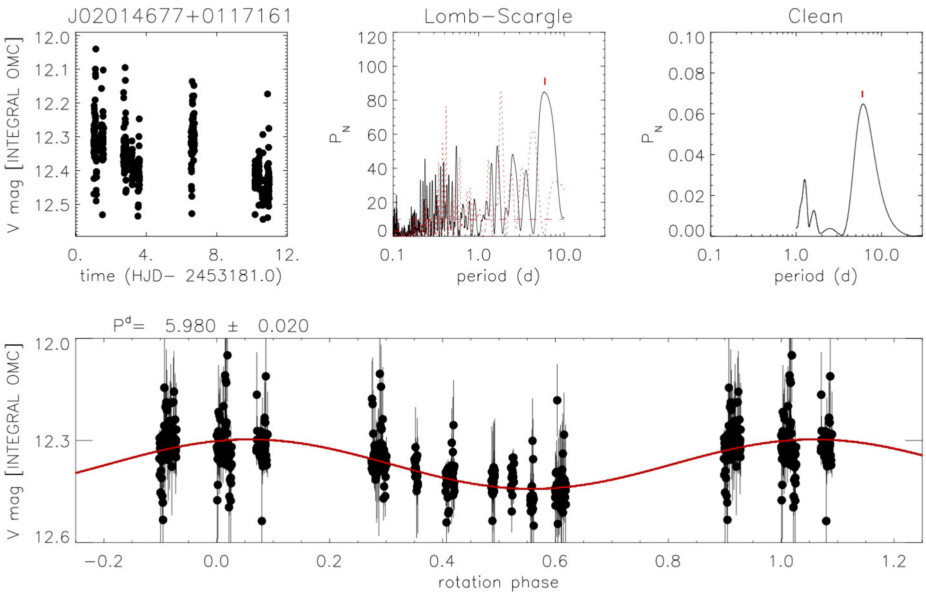

Fig. A.8. Same as in Fig. A.1 but for 2MASS J02014677+0117161 and RBS269 with data collected by INTEGRAL/OMC.

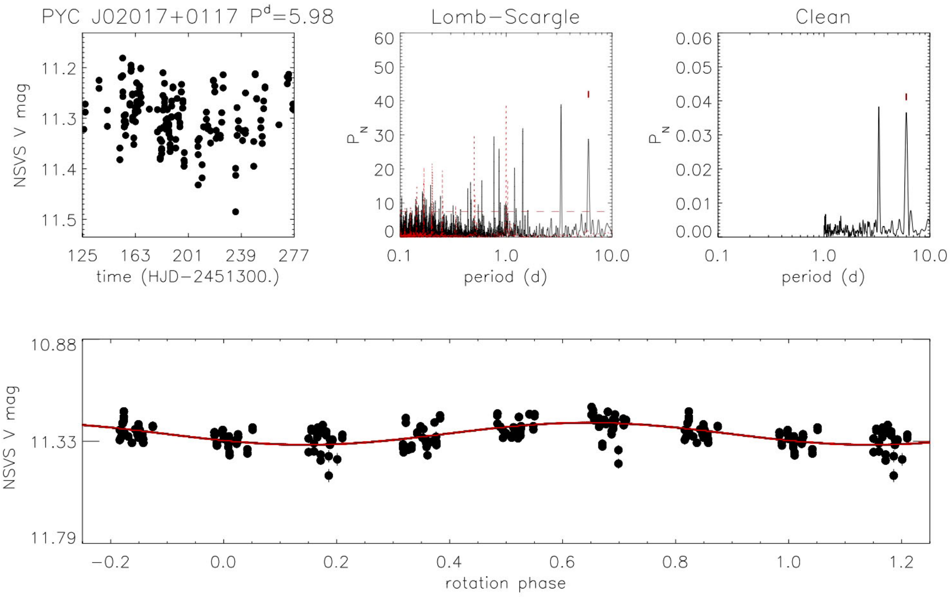

Fig. A.9. Same as in Fig. A.1 but for 2MASS J02014677+0117161 and RBS269 with data collected by NSVS.

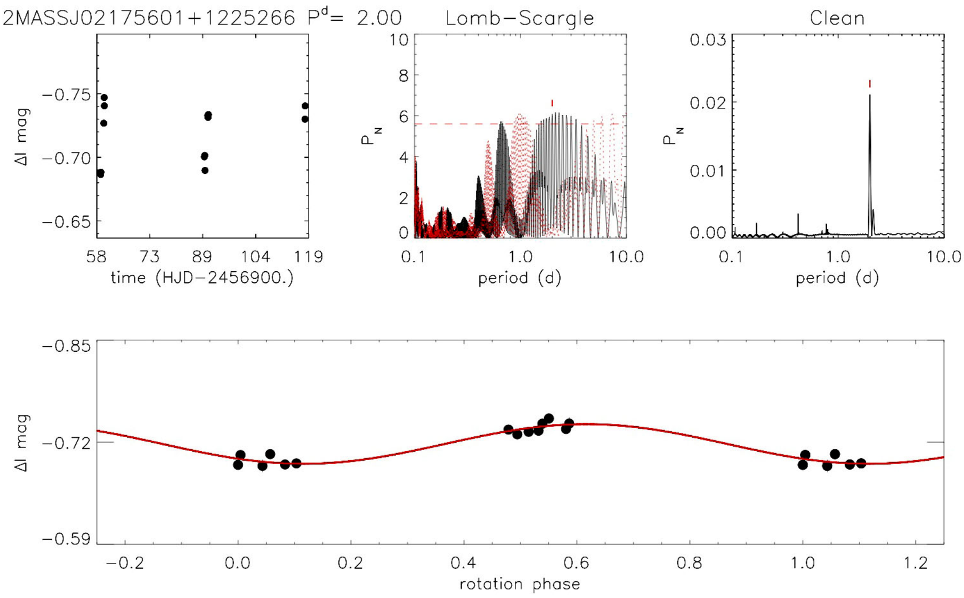

Fig. A.10. Same as in Fig. A.1 but for 2MASS J02175601+1225266 with data collected at ARIES.

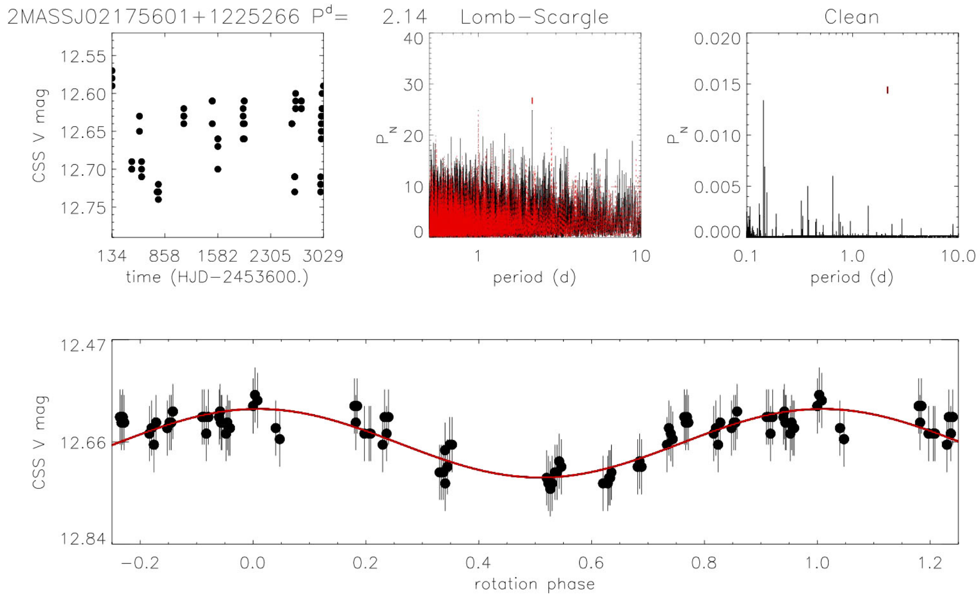

Fig. A.11. Same as in Fig. A.1 but for 2MASS J02175601+1225266 with data collected by CSS.

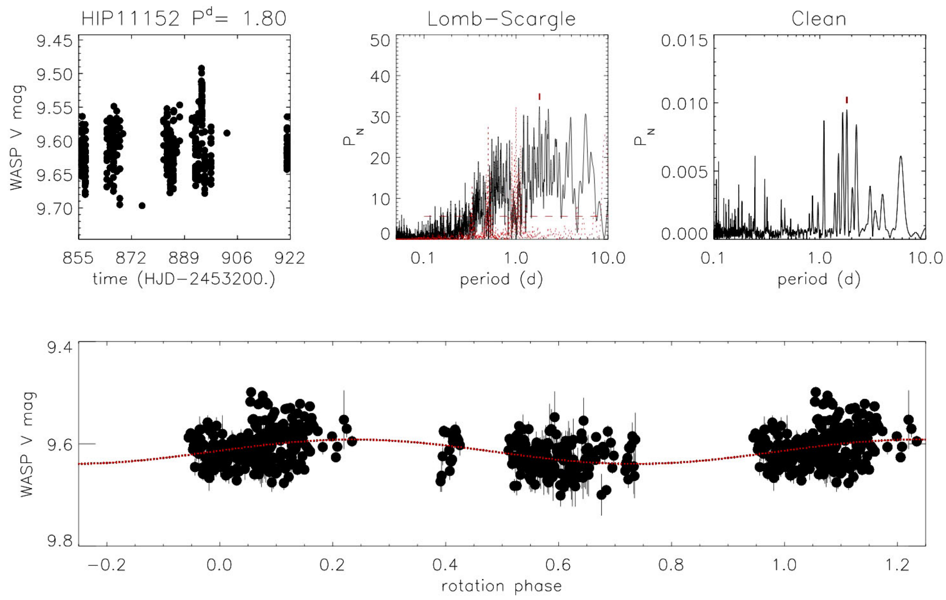

Fig. A.12. Same as in Fig. A.1 but for HIP 11152 with data collected by SuperWASP.

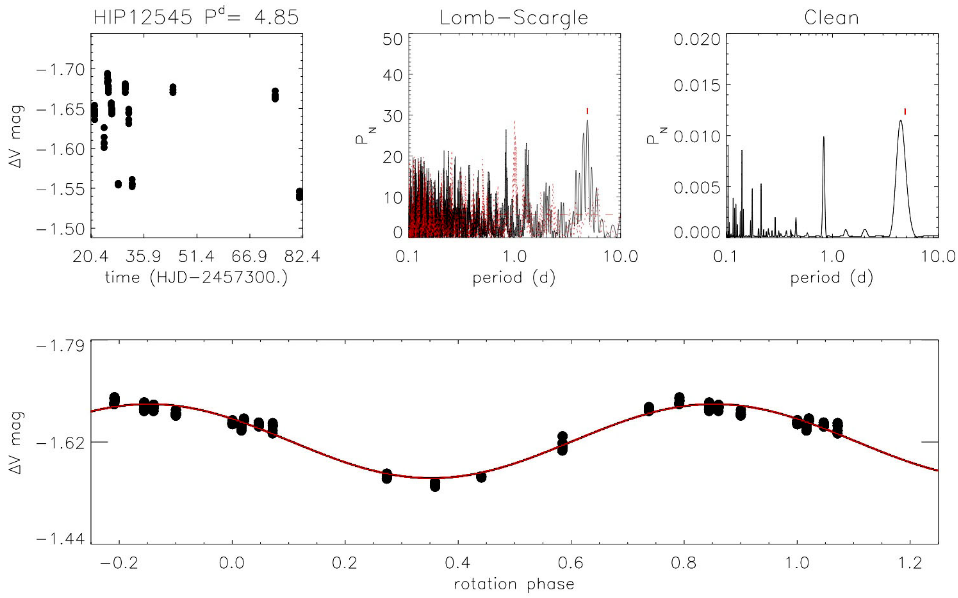

Fig. A.13. Same as in Fig. A.1 but for HIP 12545 with data collected at CrAO.

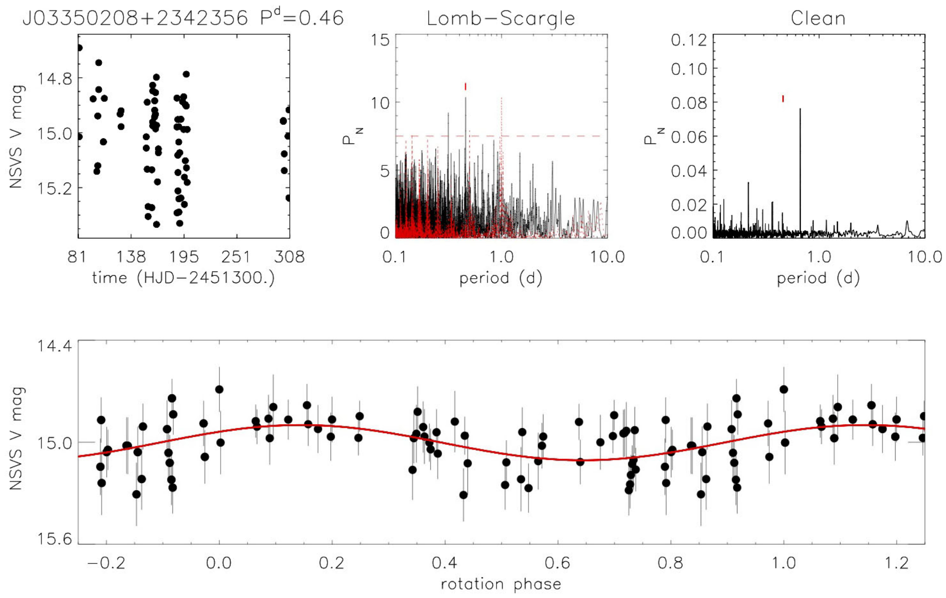

Fig. A.14. Same as in Fig. A.1 but for 2MASS J03350208+2342356 with data collected by NSVS.

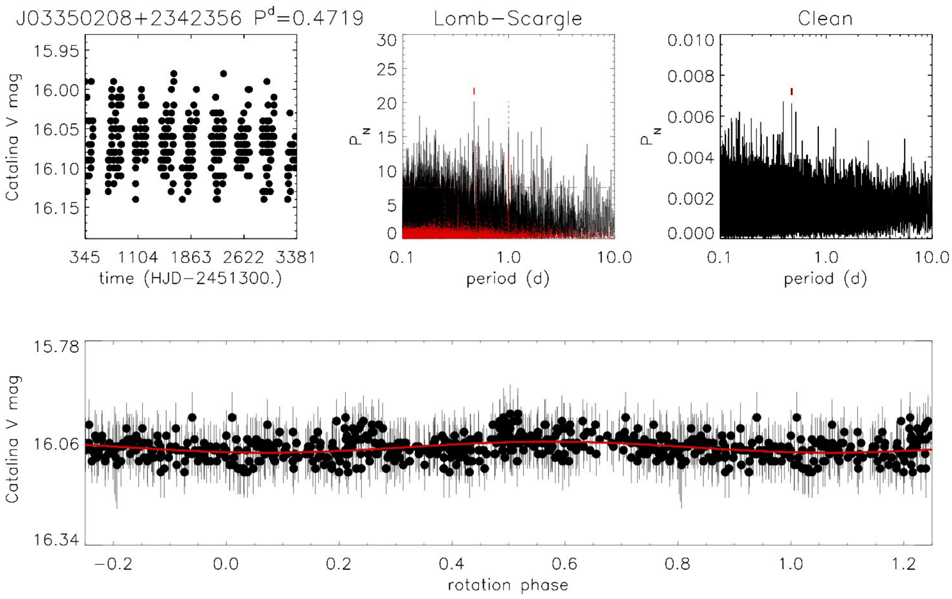

Fig. A.15. Same as in Fig. A.1 but for 2MASS J03350208+2342356 with data collected by CSS.

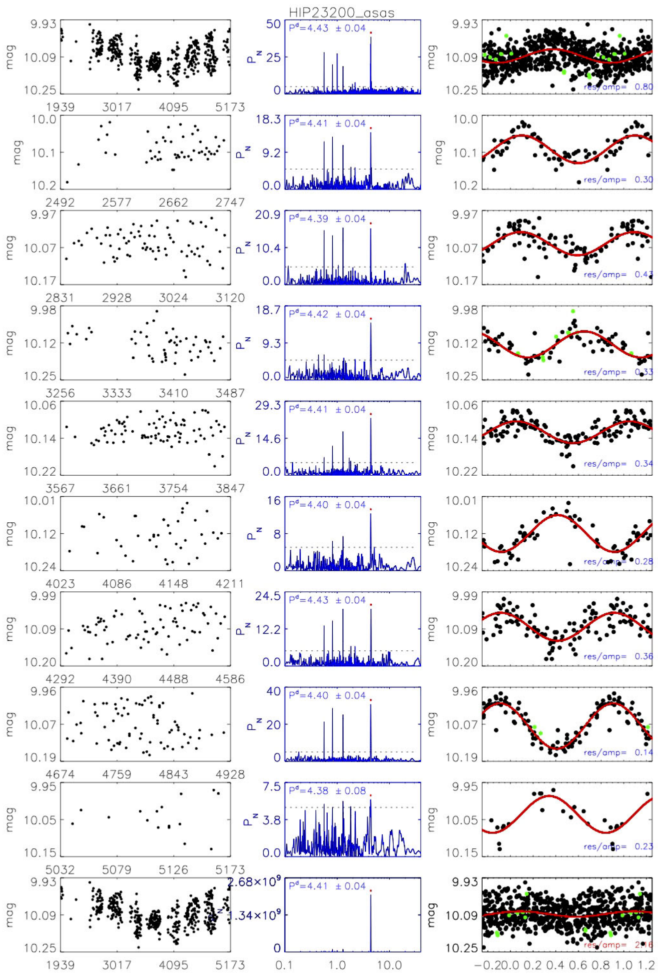

Fig. A.16. Results of the periodogram analysis for HIP 23200 with data collected by ASAS. *Left panels* show the *V* mag vs. HJD (−2450000.0); *middle panels* show the LS periodograms with labelled the rotation period; *right panels* show the light curves phased with the corresponding periods. *Top panels* refer to the complete time series, whereas the other panels to the seasonal light curves.

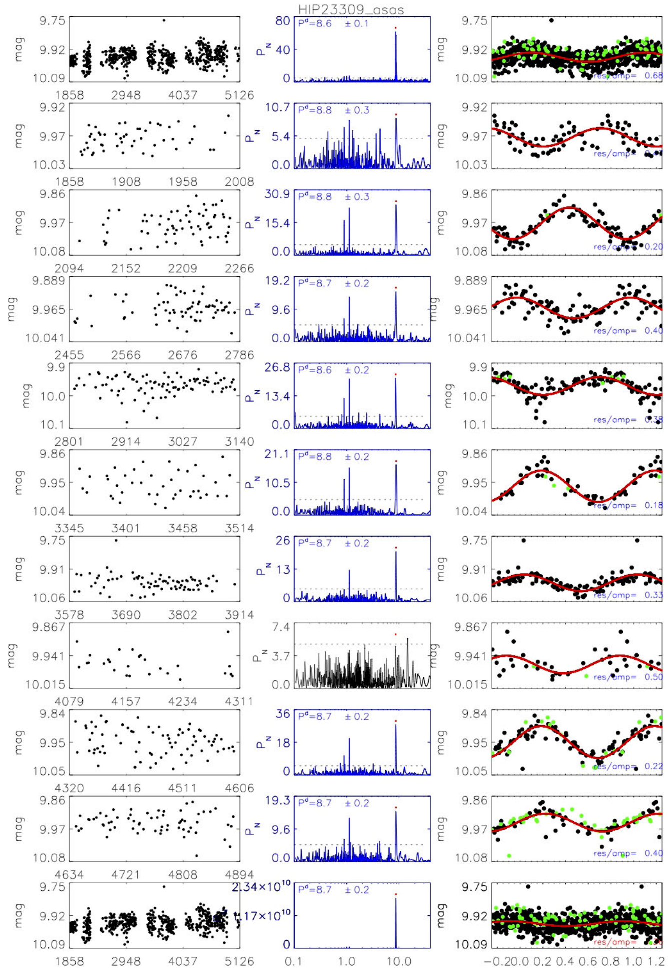

Fig. A.17. Same as in Fig. A.16 but for HIP23309 with data collected by ASAS.

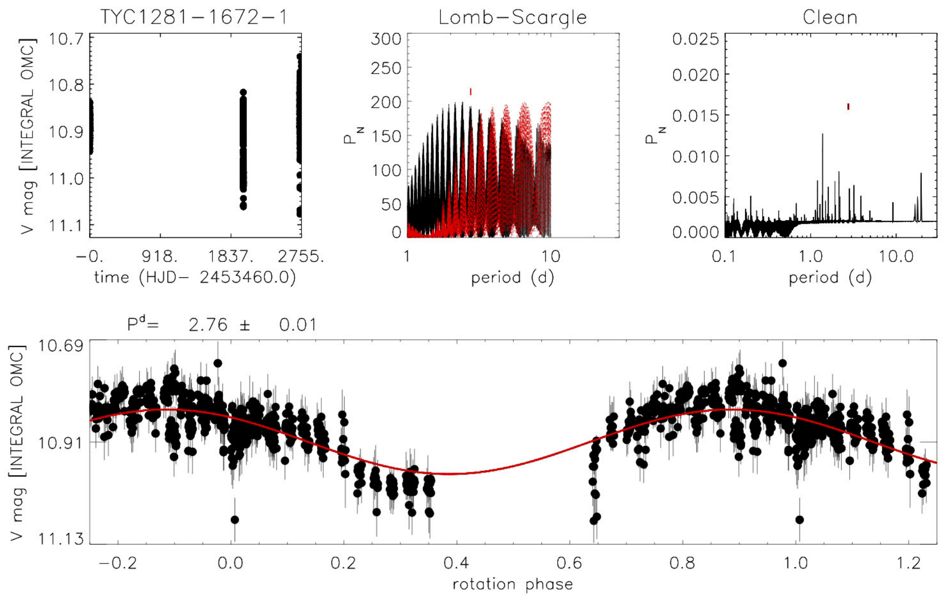

Fig. A.18. Same as in Fig. A.1 but for TYC1281 1672 1 with data collected by INTEGRAL/OMC.

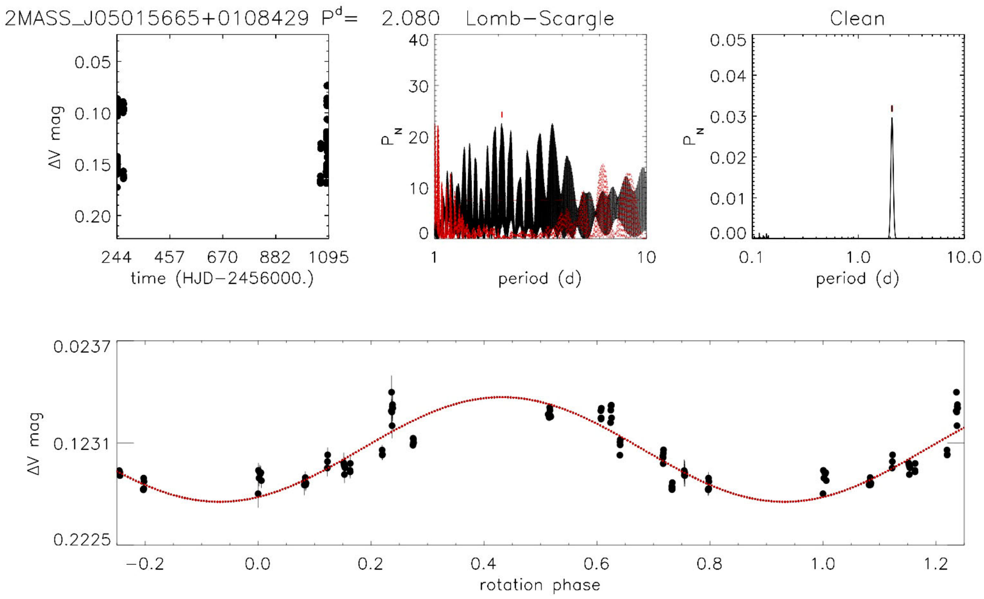

Fig. A.19. Same as in Fig. A.1 but for 2MASS J05015665+0108429 with data collected at Xinglong station.

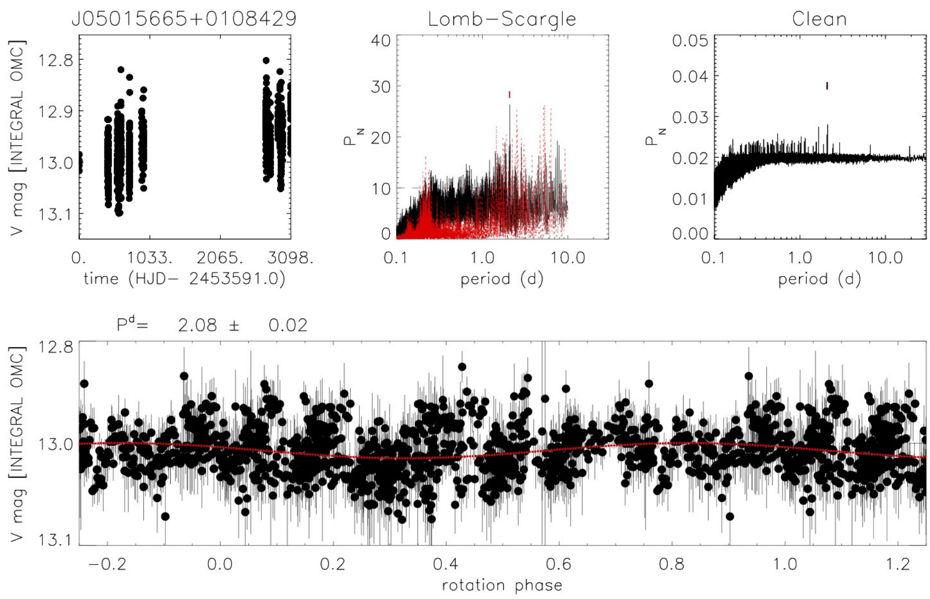

Fig. A.20. Same as in Fig. A.1 but for 2MASS J05015665+0108429 with data collected by INTEGRAL/OMC.

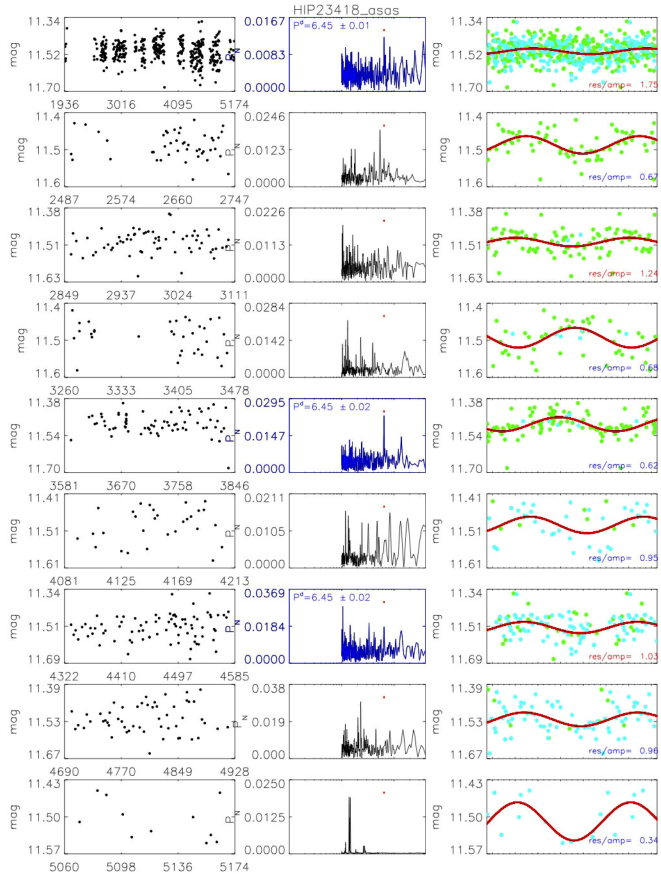

Fig. A.21. Same as in Fig. A.16 but for HIP 23418 with data collected by ASAS.

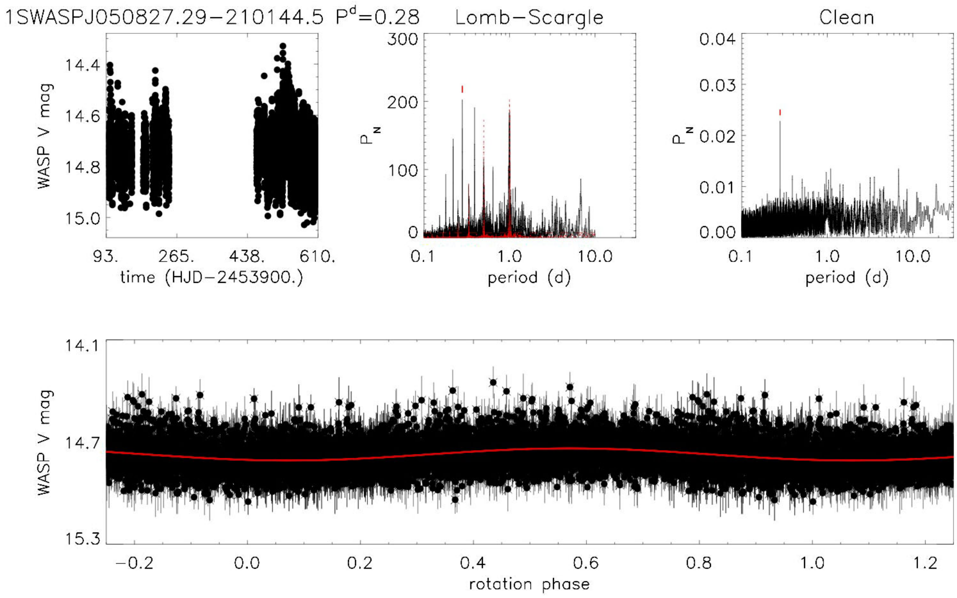

Fig. A.22. Same as in Fig. A.1 but for 2MASS J05082729-2101444 with data collected by SuperWASP.

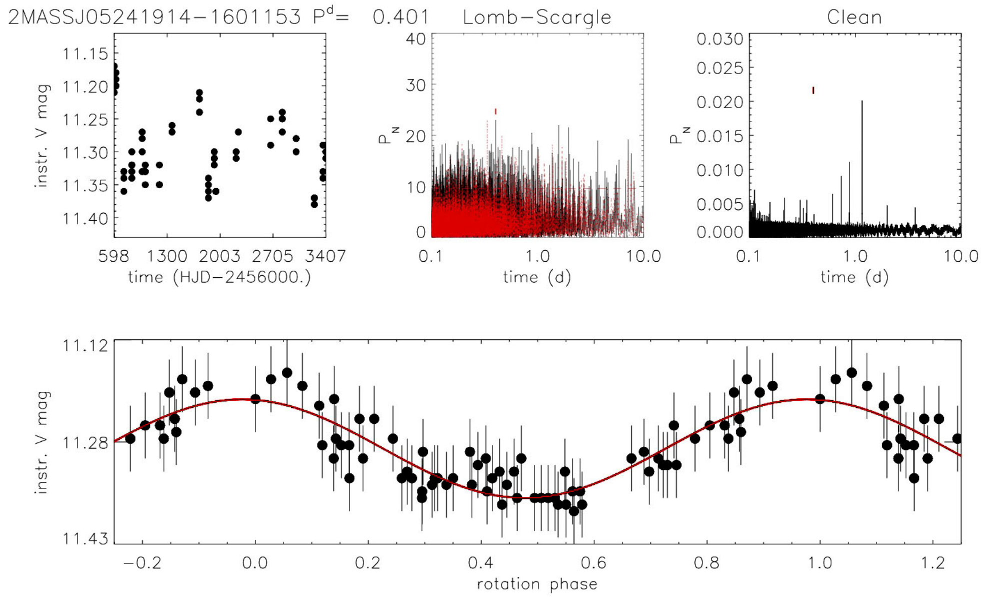

Fig. A.23. Same as in Fig. A.1 but for 2MASS J05241914-1601153 with data collected by CSS.

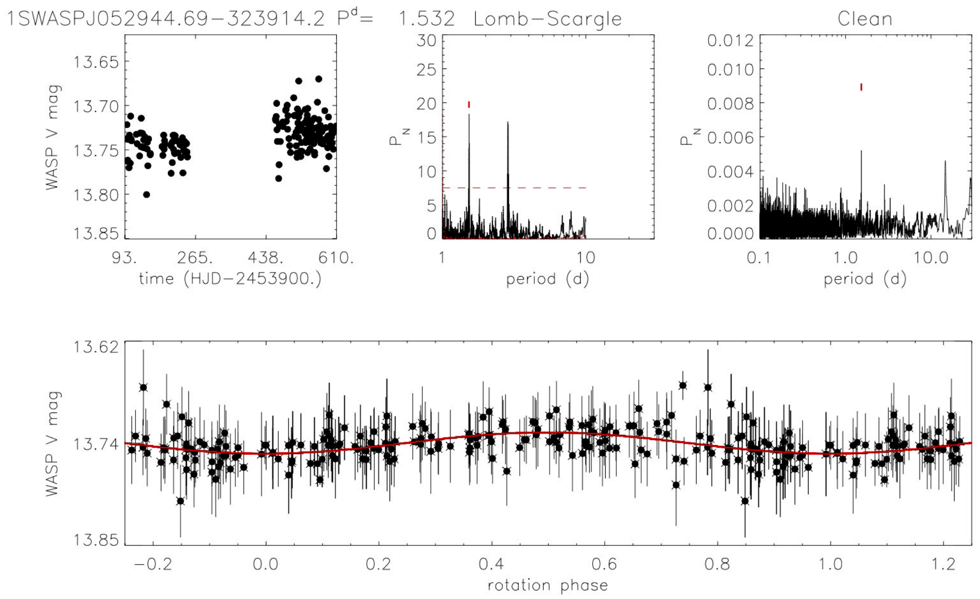

Fig. A.24. Same as in Fig. A.1 but for 2MASS J05294468-3239141 with data collected by SuperWASP.

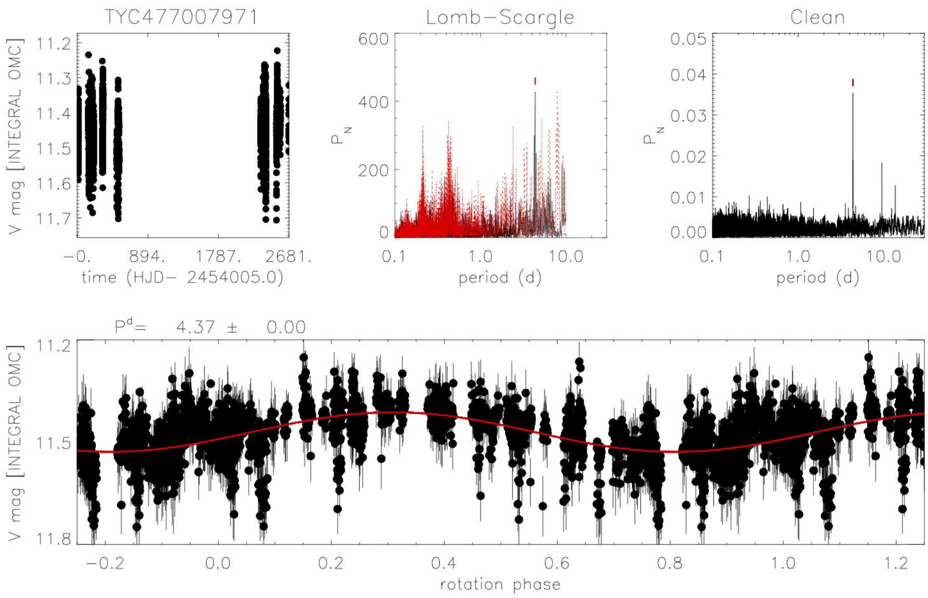

Fig. A.25. Same as in Fig. A.1 but for TYC4770 0797 1 with data collected by INTEGRAL/OMC.

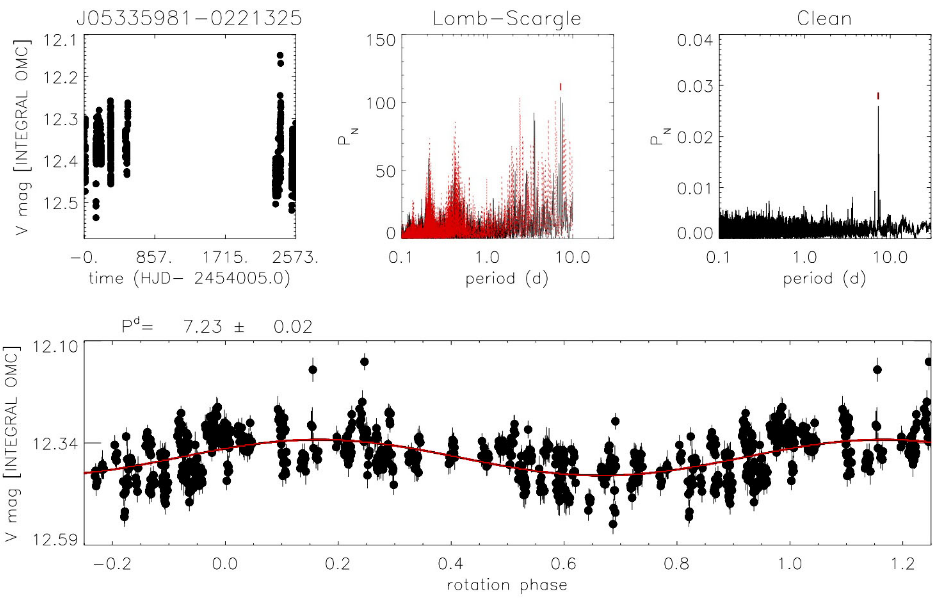

Fig. A.26. Same as in Fig. A.1 but for 2MASS J05335981-0221325 with data collected by INTEGRAL/OMC.

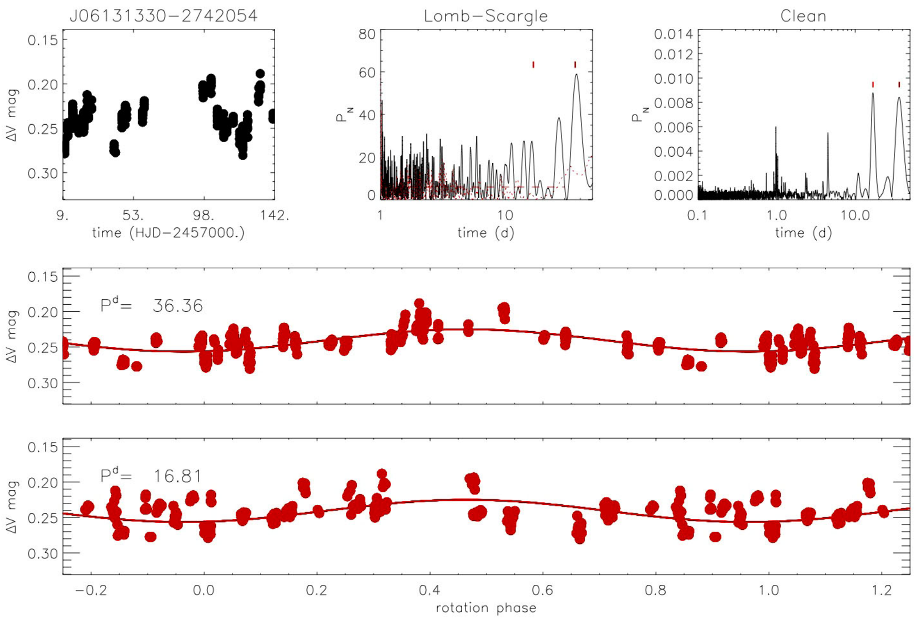

Fig. A.27. Same as in Fig. A.1 but for 2MASS J06131330-2742054 with data collected at YCO.

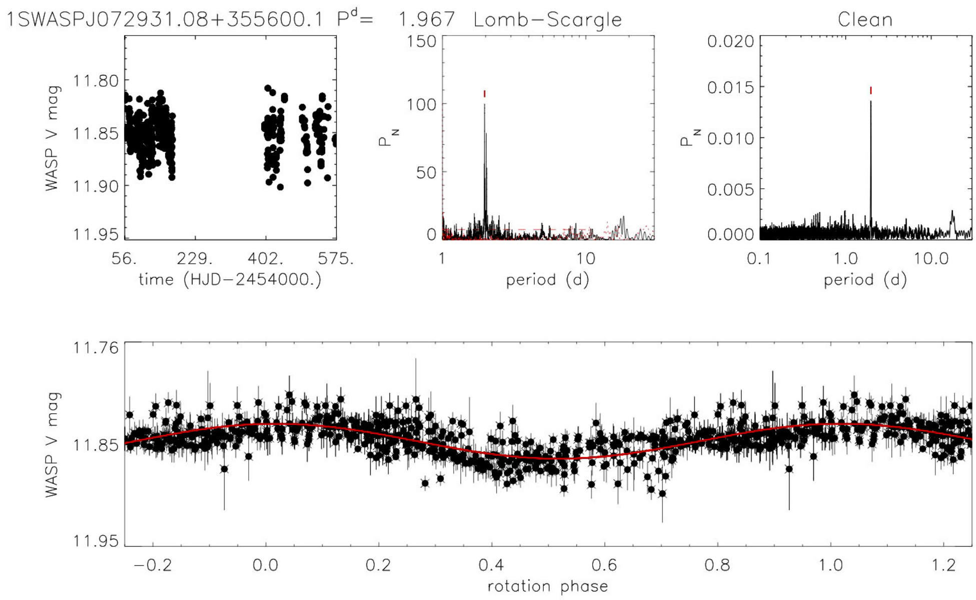

Fig. A.28. Same as in Fig. A.1 but for 2MASS J07293108+3556003AB with data collected with SuperWASP.

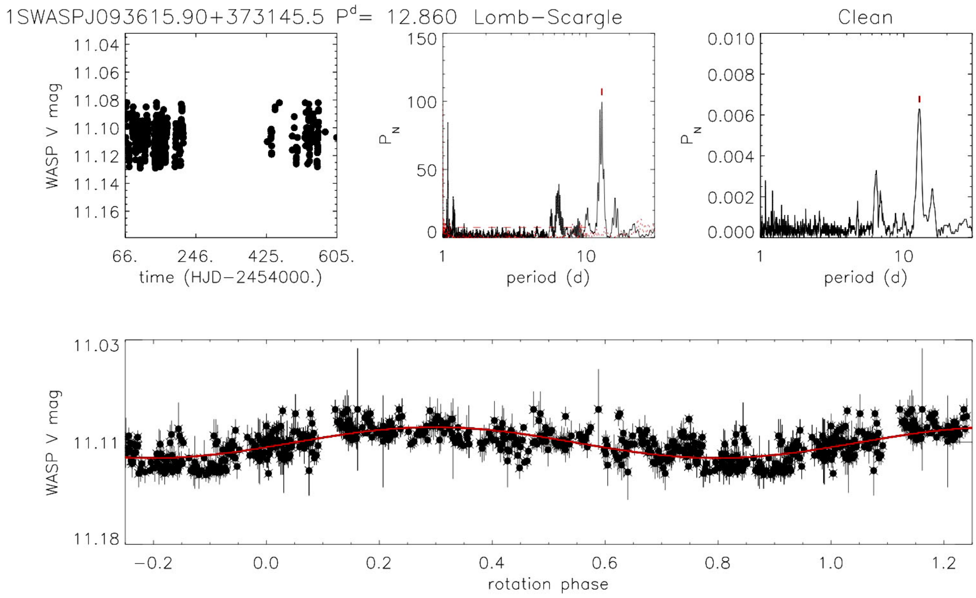

Fig. A.29. Same as in Fig. A.1 but for 2MASS J09361593+3731456AB with data collected with SuperWASP.

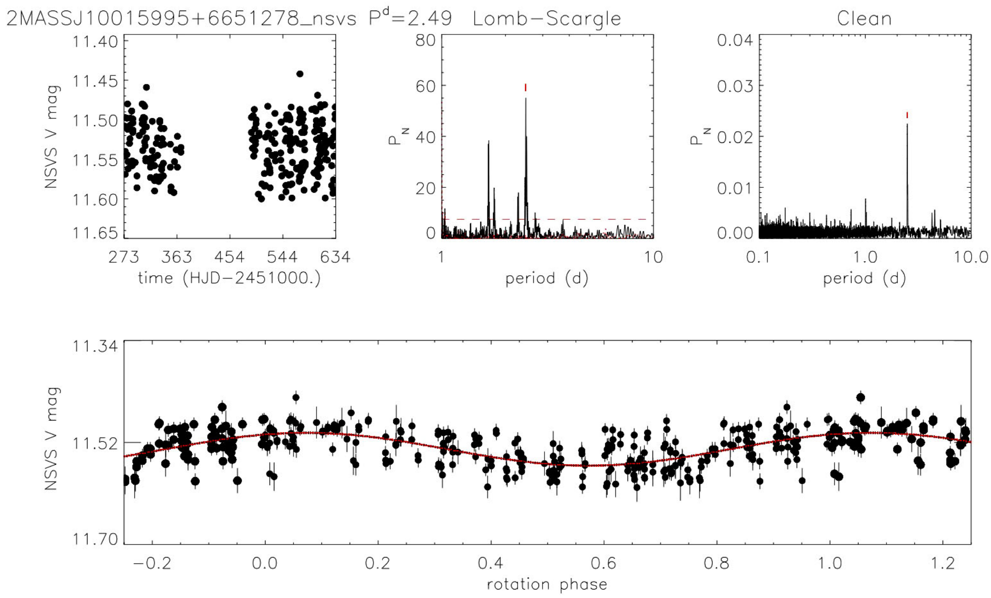

Fig. A.30. Same as in Fig. A.1 but for 2MASS J10015995+6651278 with data collected by NSVS.

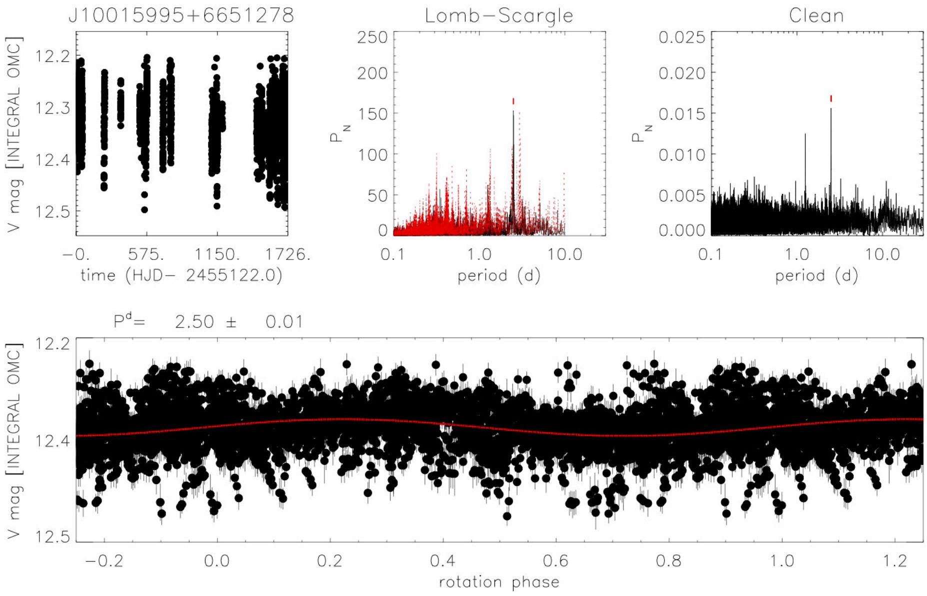

Fig. A.31. Same as in Fig. A.1 but for 2MASS J10015995+6651278 with data collected by INTEGRAL/OMC.

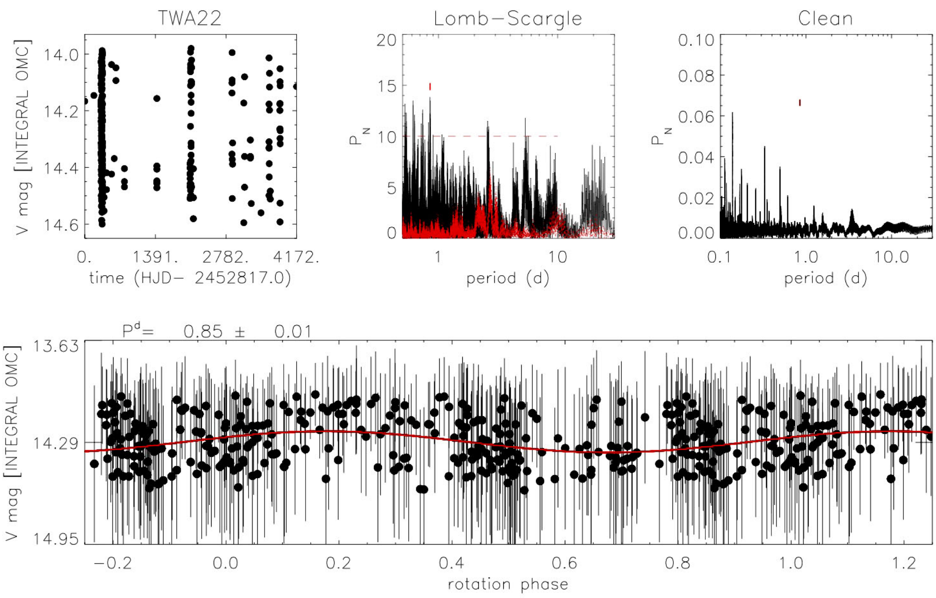

Fig. A.32. Same as in Fig. A.1 but for TWA 22 with data collected by INTEGRAL/OMC.

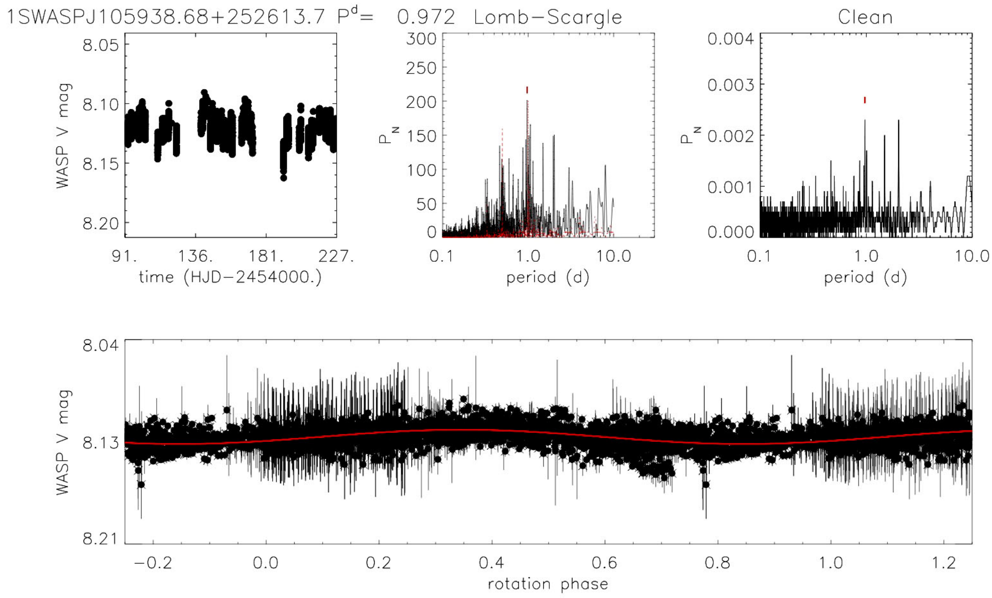

Fig. A.33. Same as in Fig. A.1 but for BD+262161AB with data collected by SuperWASP.

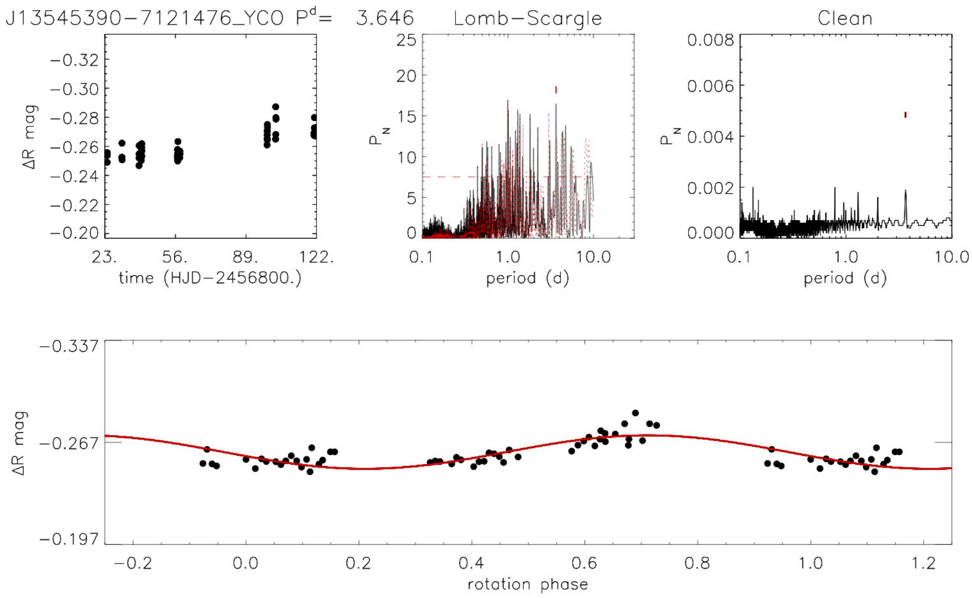

Fig. A.34. Same as in Fig. A.1 but for 2MASS J13545390-7121476 with data collected at YCO.

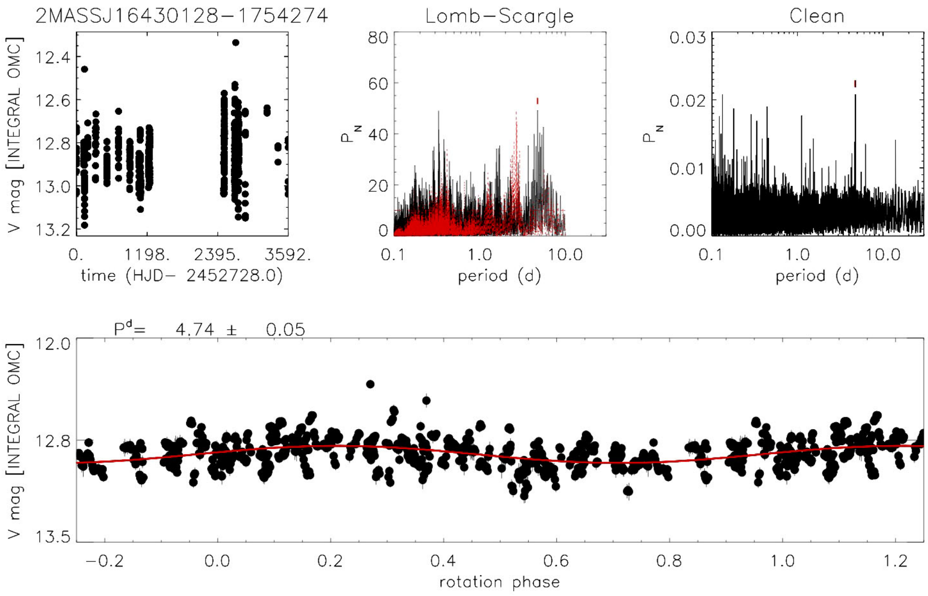

Fig. A.35. Same as in Fig. A.1 but for 2MASS J16430128-1754274 with data collected by INTEGRAL/OMC.

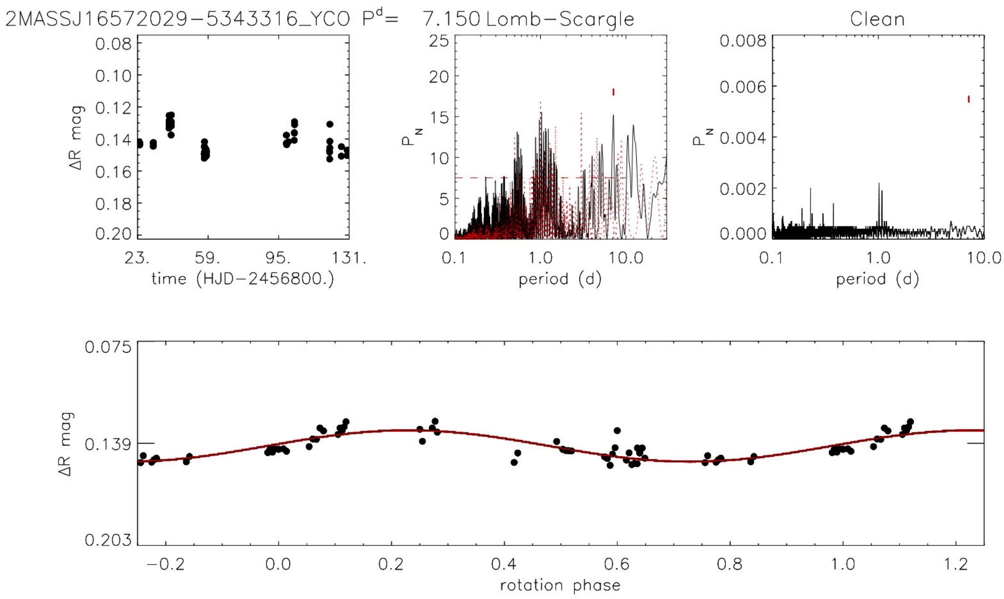

Fig. A.36. Same as in Fig. A.1 but for 2MASS J16572029-5343316 with data collected at YCO.

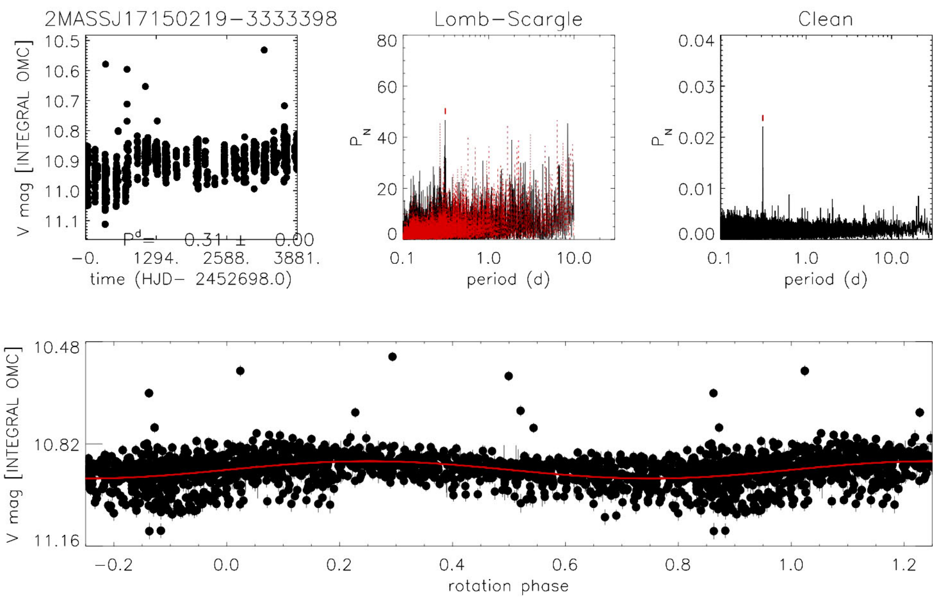

Fig. A.37. Same as in Fig. A.1 but for 2MASS J17150219-3333398 with data collected by INTEGRAL/OMC.

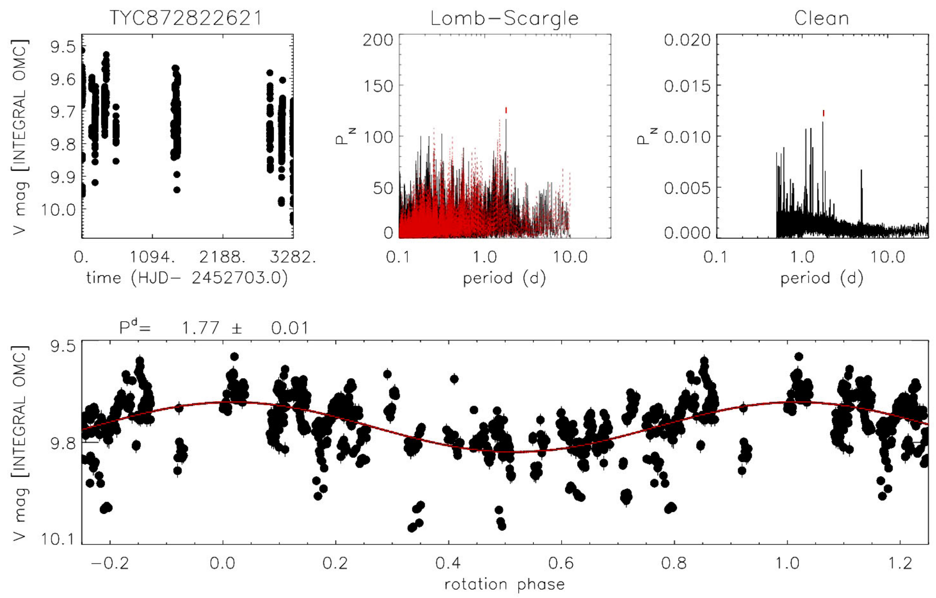

Fig. A.38. Same as in Fig. A.1 but for TYC8728 2262 1 with data collected by INTEGRAL/OMC.

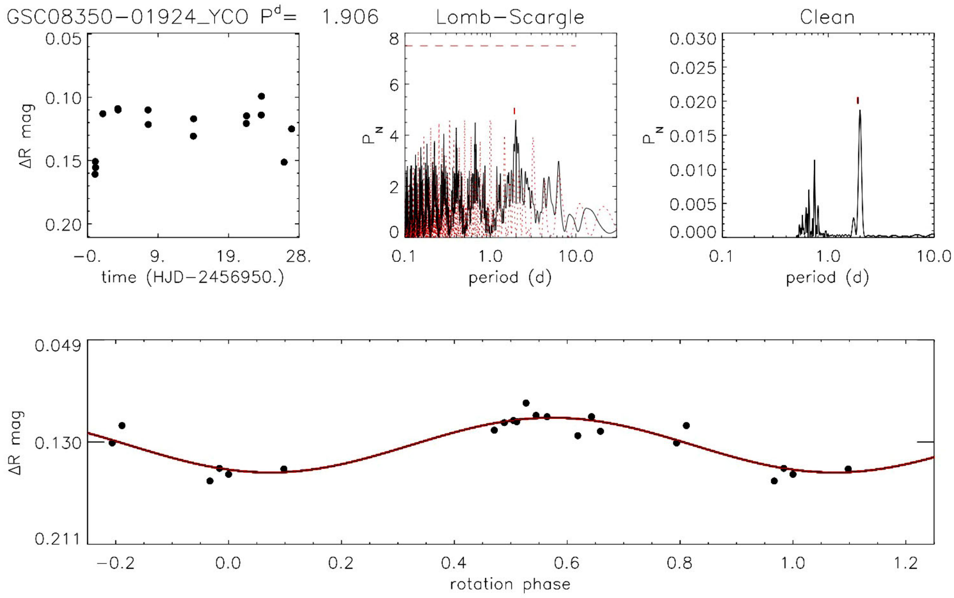

Fig. A.39. Same as in Fig. A.1 but for GSC08350-01924 with data collected at YCO.

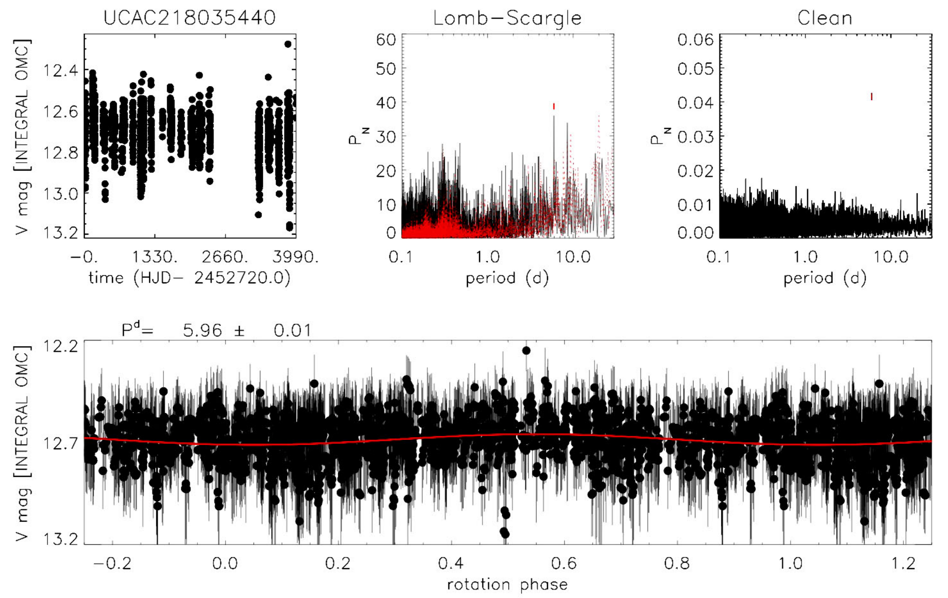

Fig. A.40. Same as in Fig. A.1 but for UCAC2 18035440 with data collected by INTEGRAL/OMC.

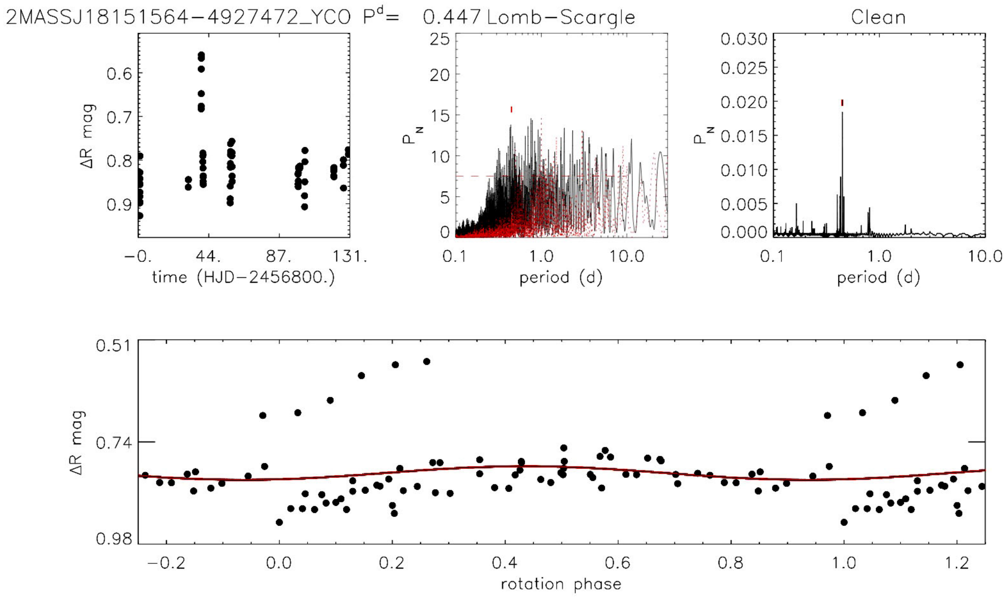

Fig. A.41. Same as in Fig. A.1 but for 2MASS J18151564-4927472 with data collected at YCO.

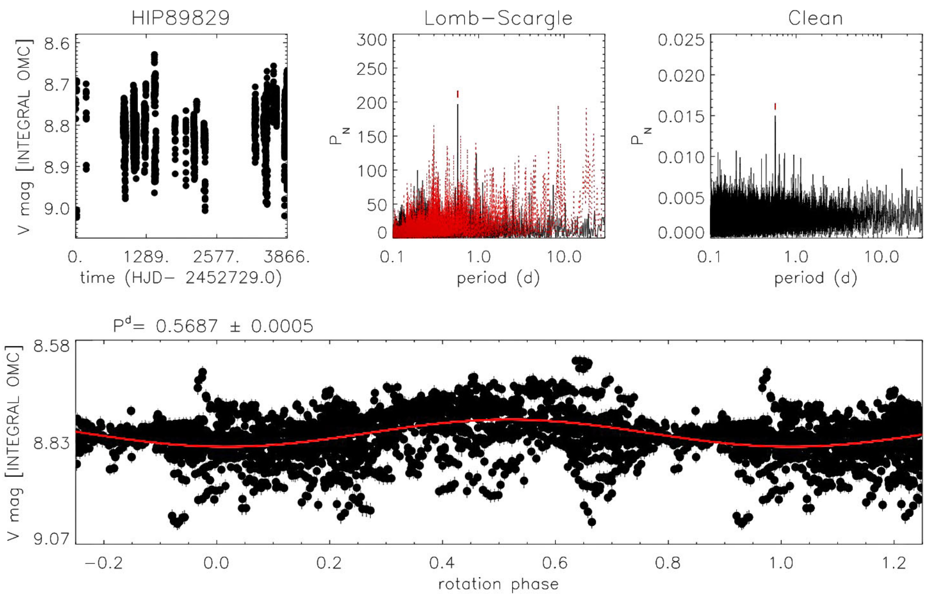

Fig. A.42. Same as in Fig. A.1 but for HIP 89829 with data collected by INTEGRAL/OMC.

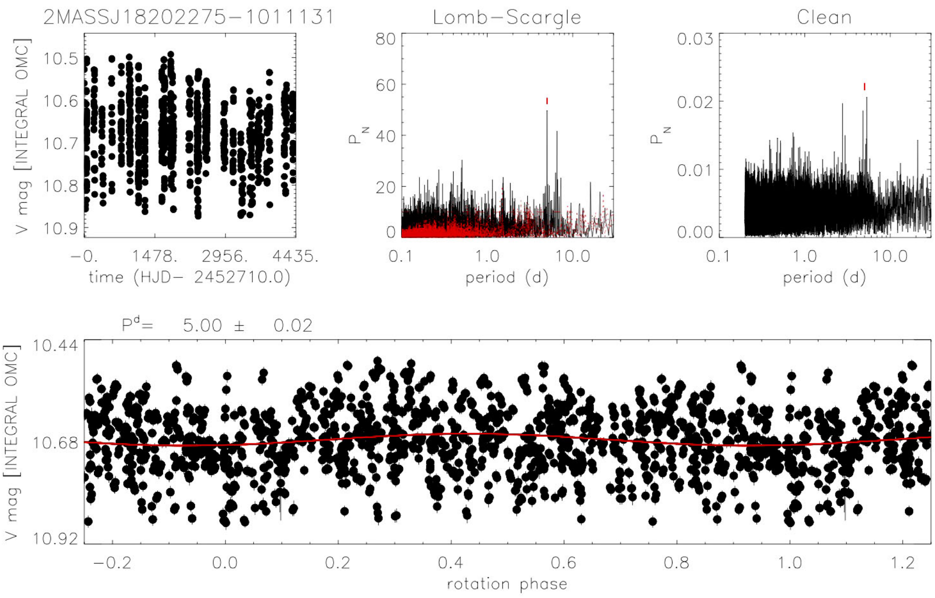

Fig. A.43. Same as in Fig. A.1 but for 2MASS J18202275-1011131 with data collected by INTEGRAL/OMC.

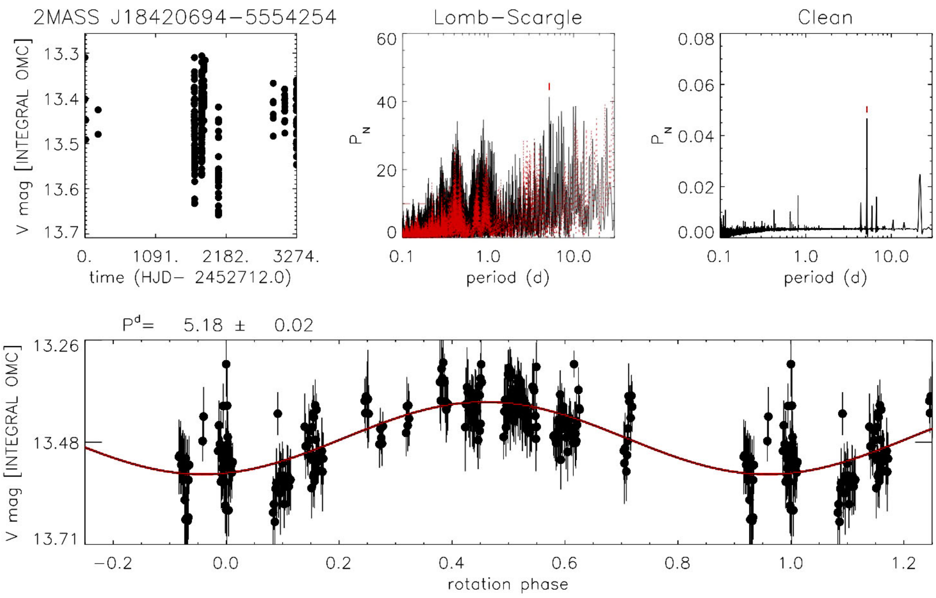

Fig. A.44. Same as in Fig. A.1 but for 2MASS J18420694-5554254 with data collected by INTEGRAL/OMC.

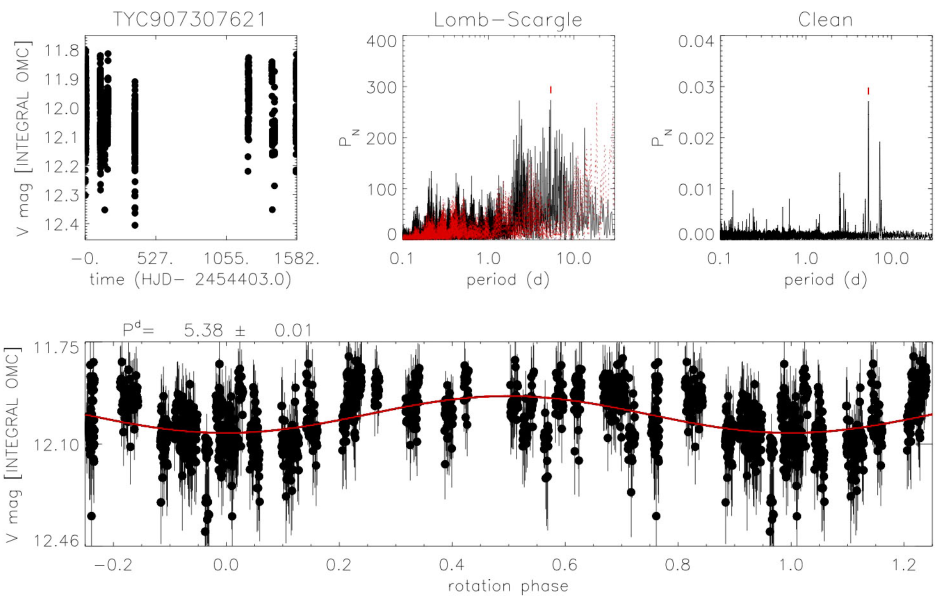

Fig. A.45. Same as in Fig. A.1 but for TYC9073 0762 1 with data collected by INTEGRAL/OMC.

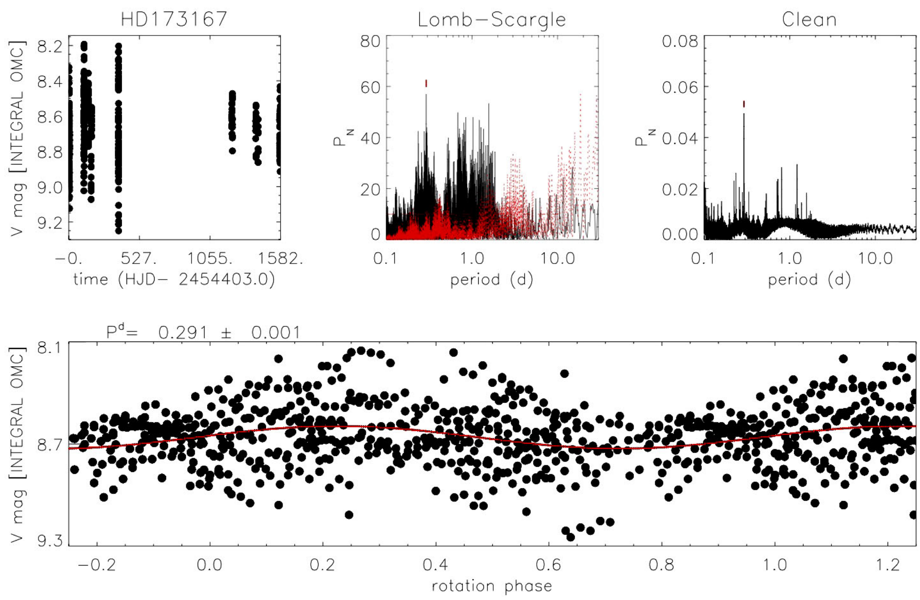

Fig. A.46. Same as in Fig. A.1 but for HD 173167 with data collected by INTEGRAL/OMC.

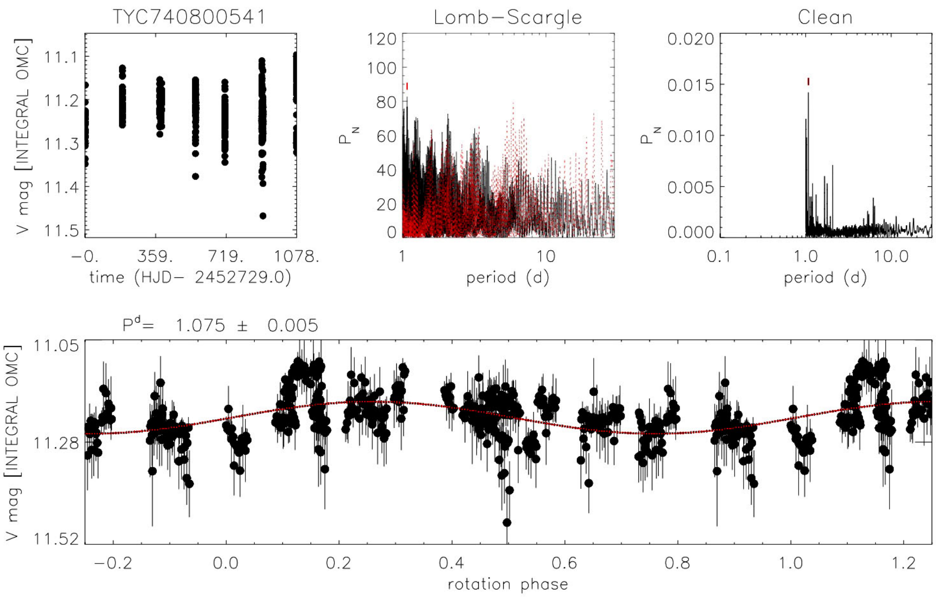

Fig. A.47. Same as in Fig. A.1 but for TYC7408 0054 1 with data collected by INTEGRAL/OMC.

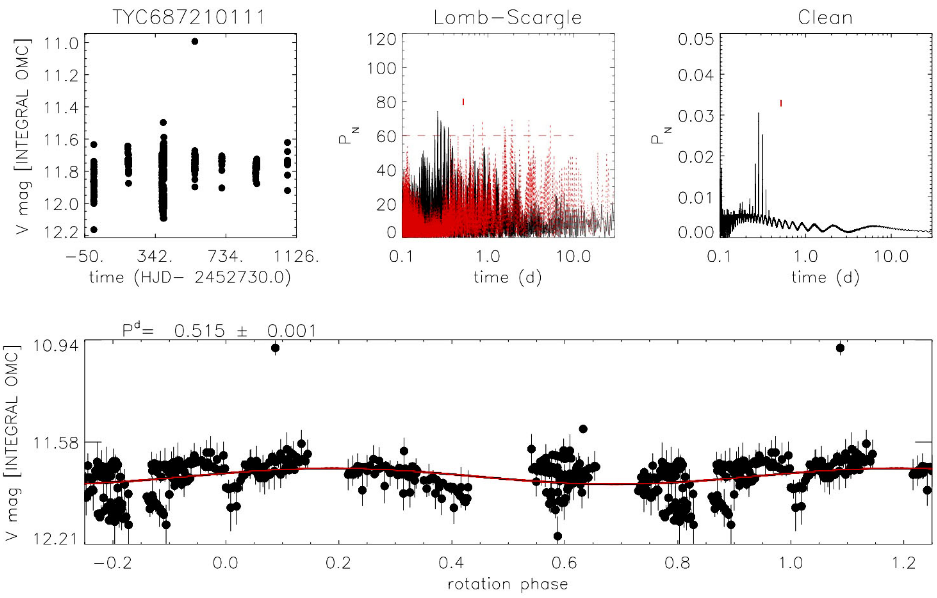

Fig. A.48. Same as in Fig. A.1 but for TYC6872 1011 1 with data collected by INTEGRAL/OMC.

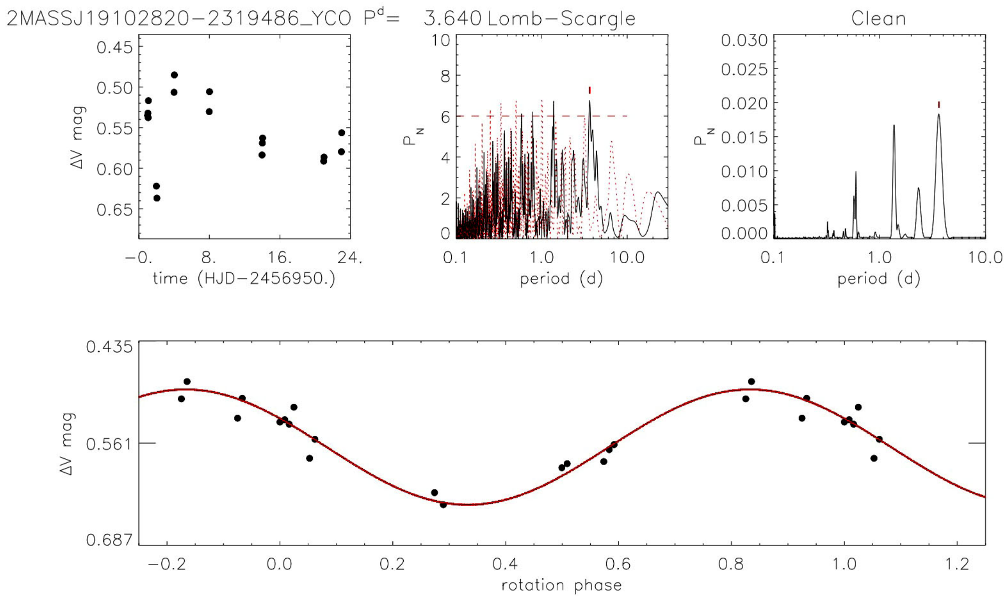

Fig. A.49. Same as in Fig. A.1 but for 2MASS J19102820-2319486 with data collected at YCO.

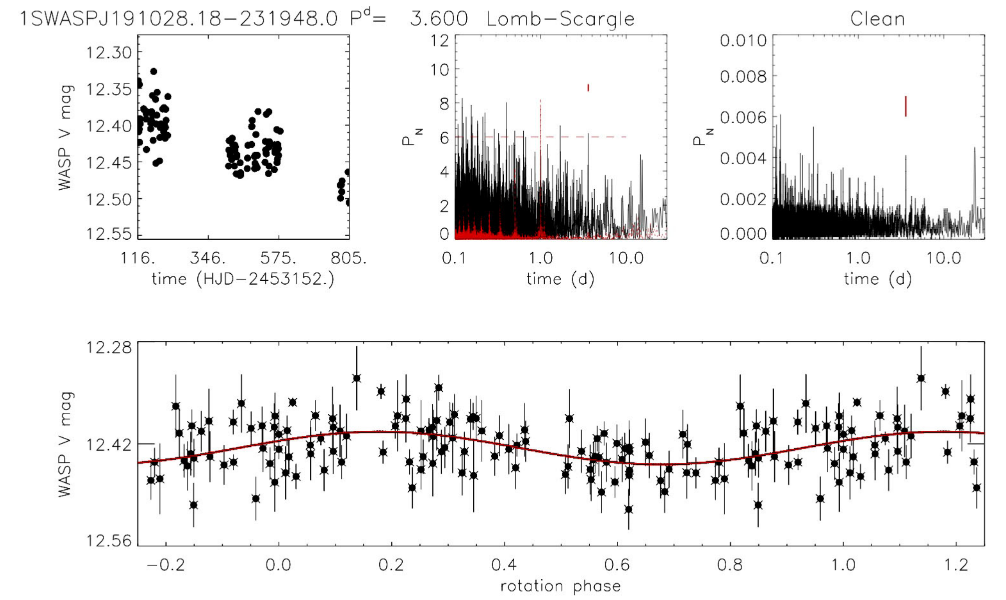

Fig. A.50. Same as in Fig. A.1 but for 2MASS J19102820-2319486 with data collected by SuperWASP.

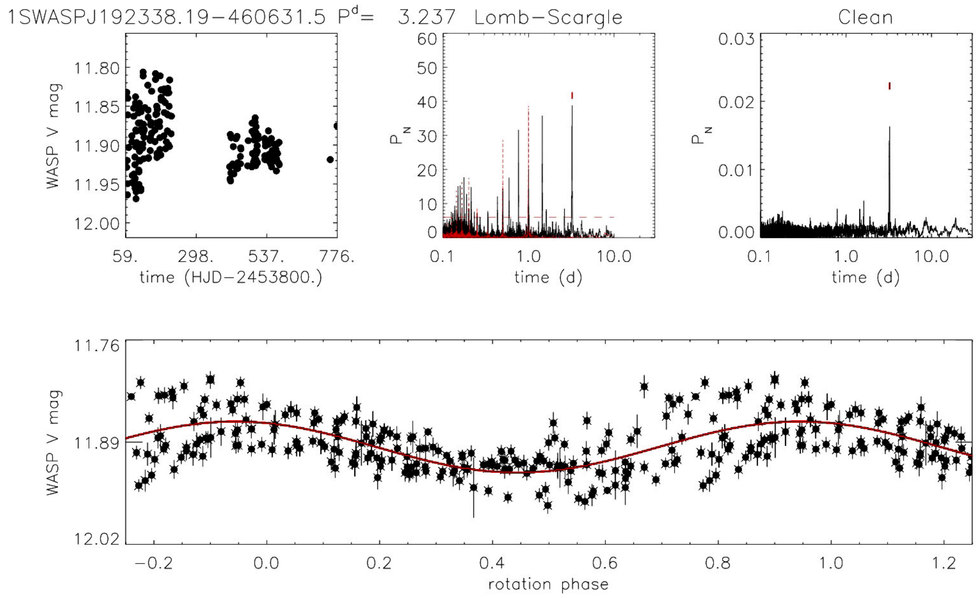

Fig. A.51. Same as in Fig. A.1 but for 2MASS J19233820-4606316 with data collected by SuperWASP.

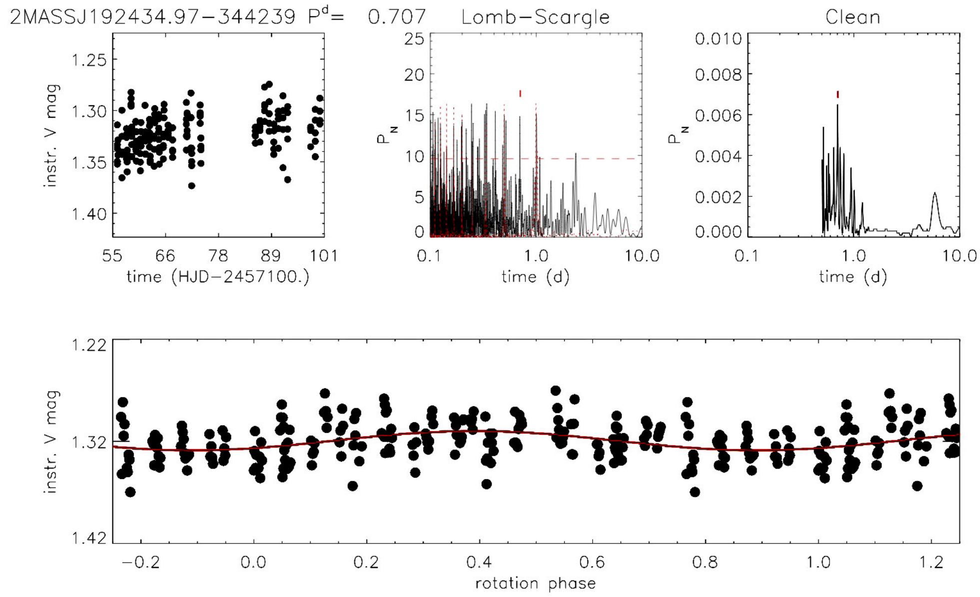

Fig. A.52. Same as in Fig. A.1 but for 2MASS J19243494-3442392 with data collected at ROAD.

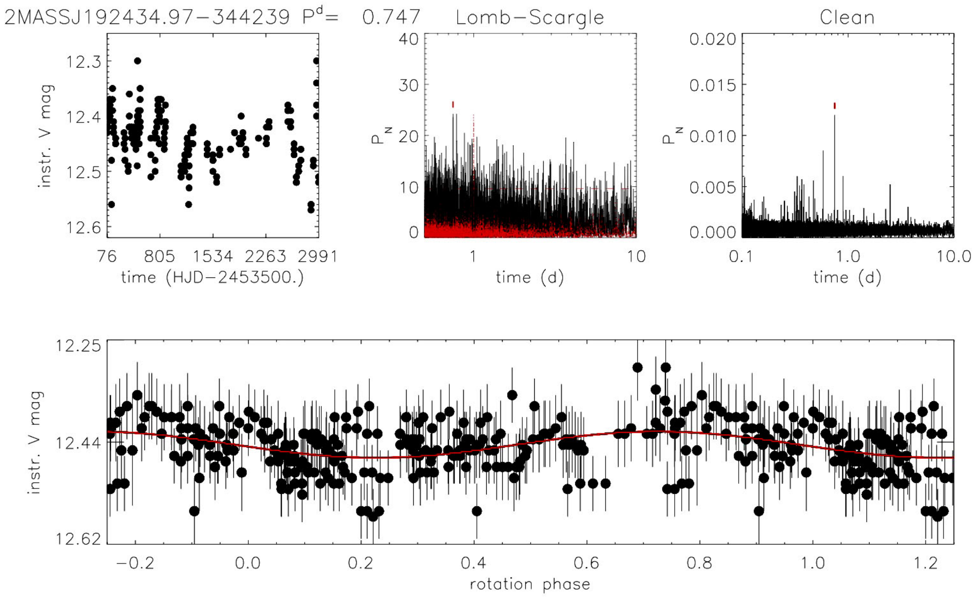

Fig. A.53. Same as in Fig. A.1 but for 2MASS J19243494-3442392 with data collected by CSS.

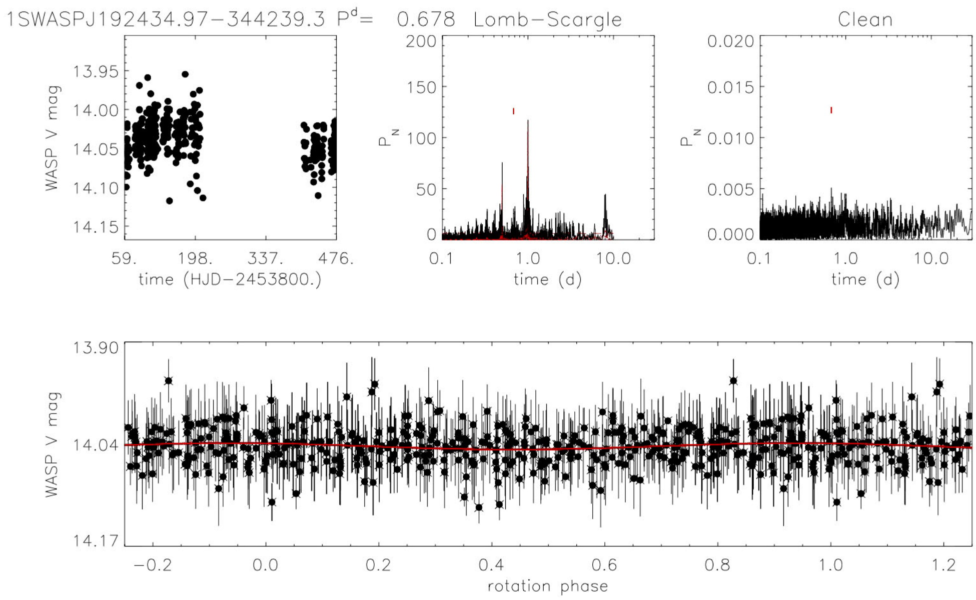

Fig. A.54. Same as in Fig. A.1 but for 2MASS J19243494-3442392 with data collected by SuperWASP.

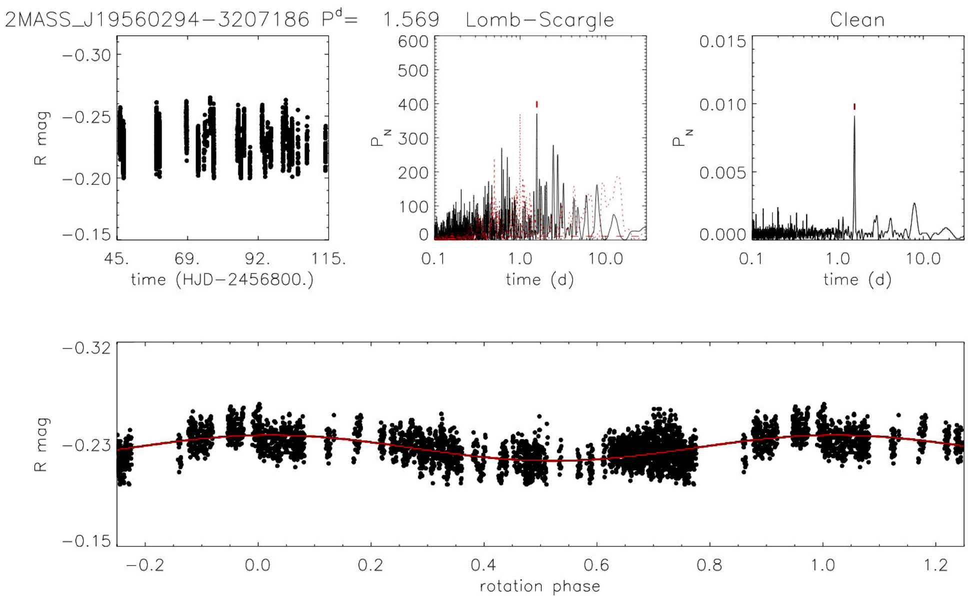

Fig. A.55. Same as in Fig. A.1 but for 2MASS J19560294-3207186AB with data collected at KKO.

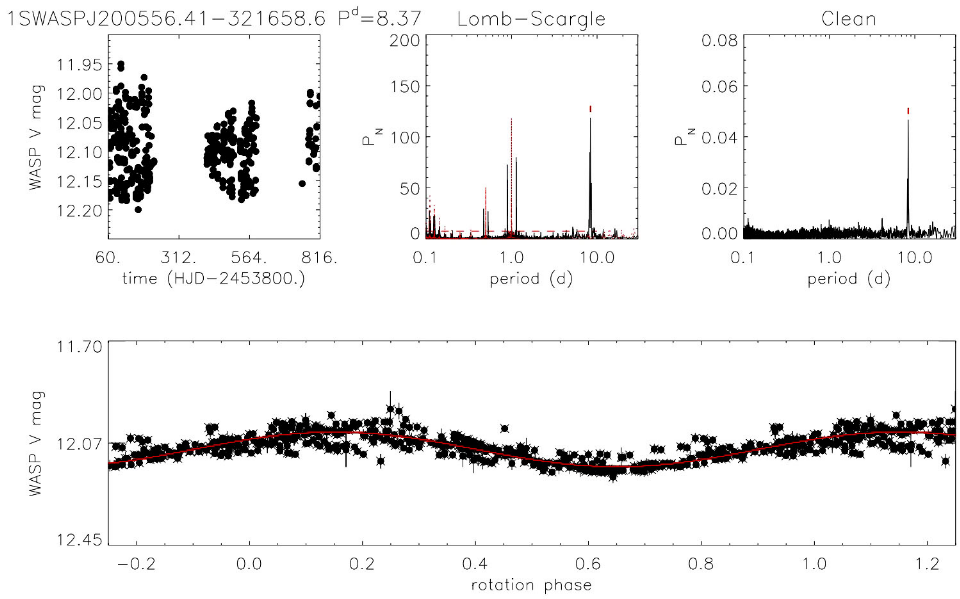

Fig. A.56. Same as in Fig. A.1 but for 2MASS J20055640-3216591 with data collected by SuperWASP.

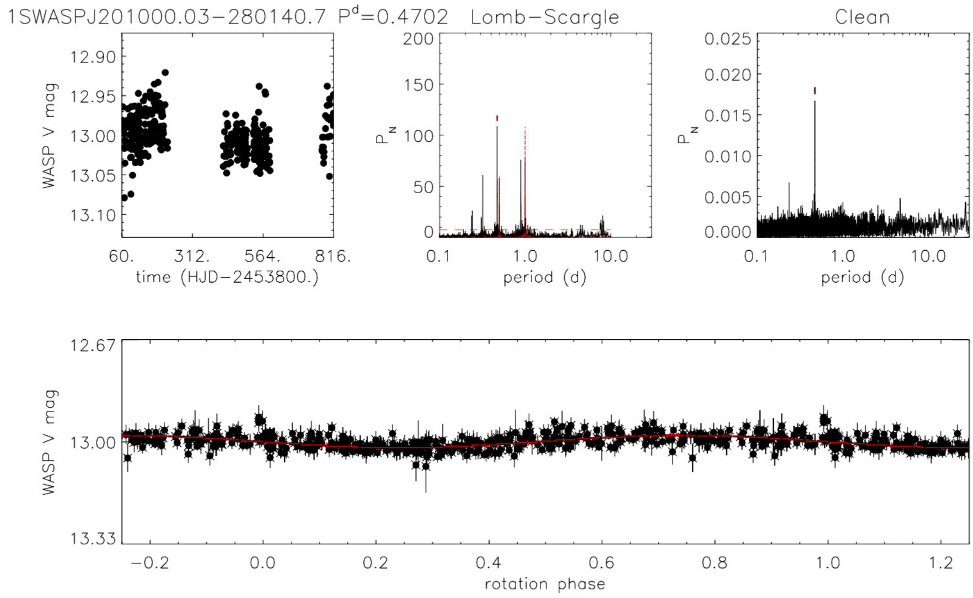

Fig. A.57. Same as in Fig. A.1 but for 2MASS J20100002-2801410AB with data collected by SuperWASP.

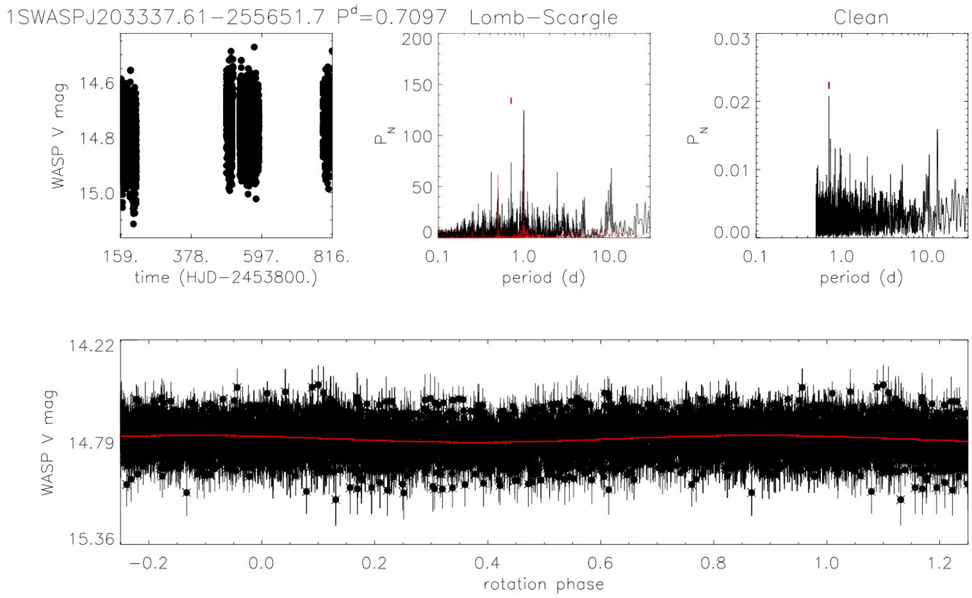

Fig. A.58. Same as in Fig. A.1 but for 2MASS J20333759-2556521 with data collected by SuperWASP.

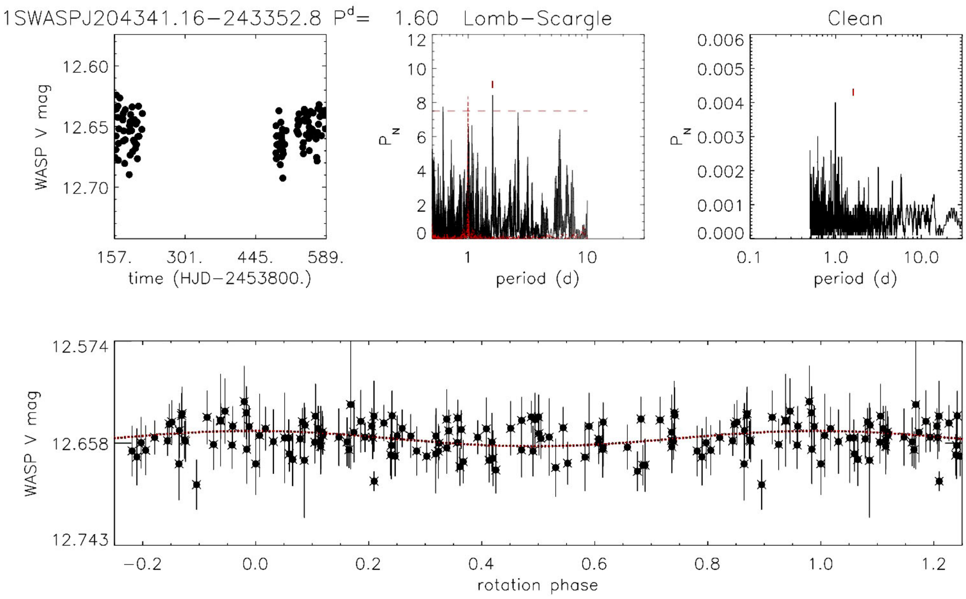

Fig. A.59. Same as in Fig. A.1 but for 2MASS J20434114-2433534 with data collected by SuperWASP.

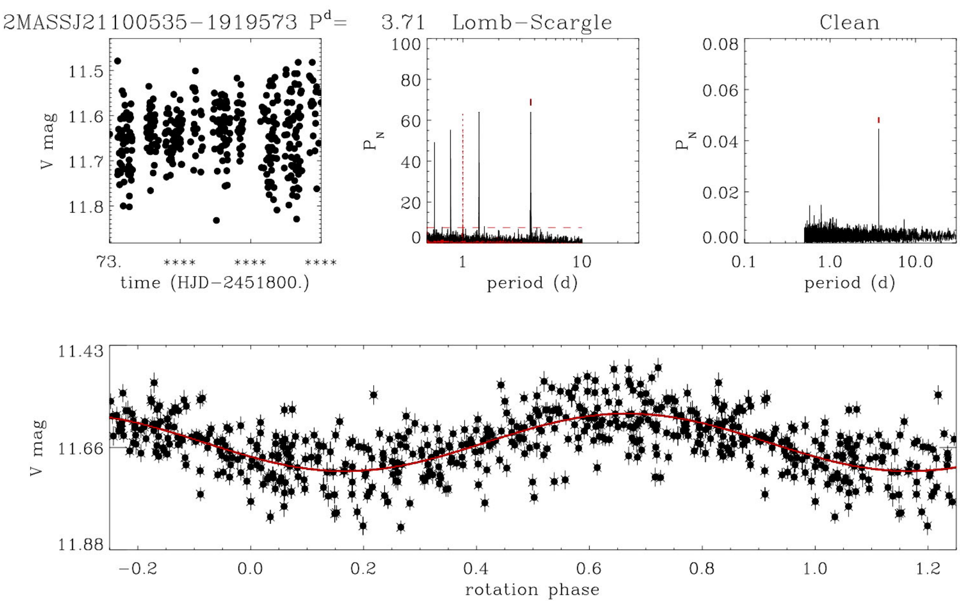

Fig. A.60. Same as in Fig. A.1 but for 2MASS J21100535-1919573 with data collected by SuperWASP.

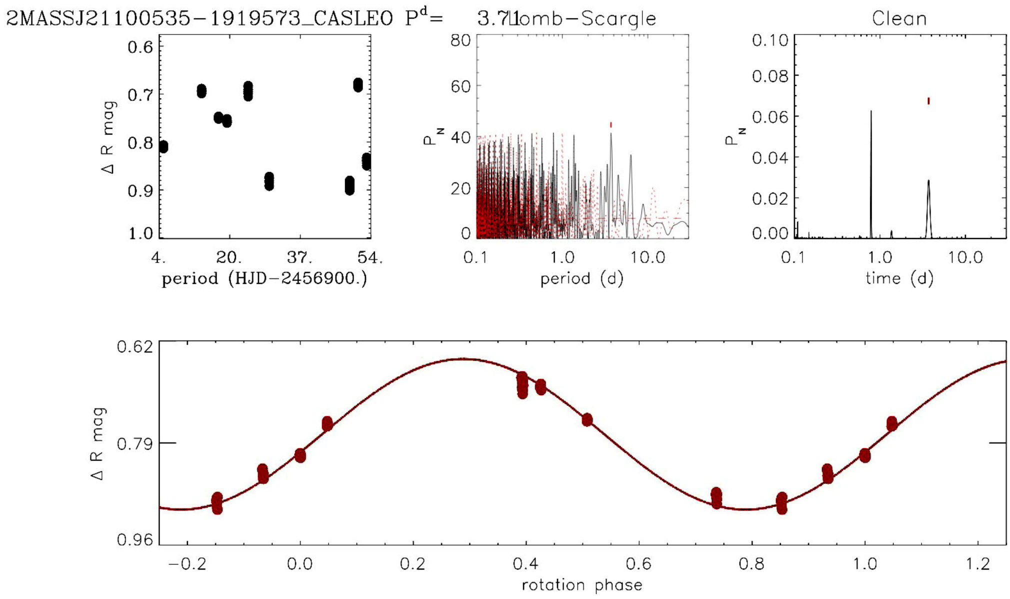

Fig. A.61. Same as in Fig. A.1 but for 2MASS J21100535-1919573 with data collected at CASLEO.

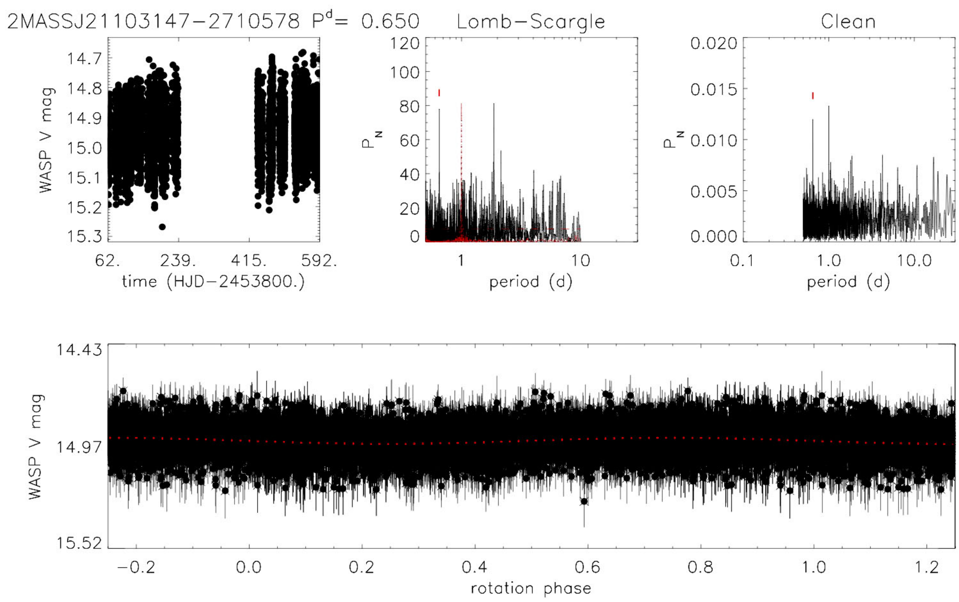

Fig. A.62. Same as in Fig. A.1 but for 2MASS J21103147-2710578 and J21103096-2710513 with data collected by SuperWASP.

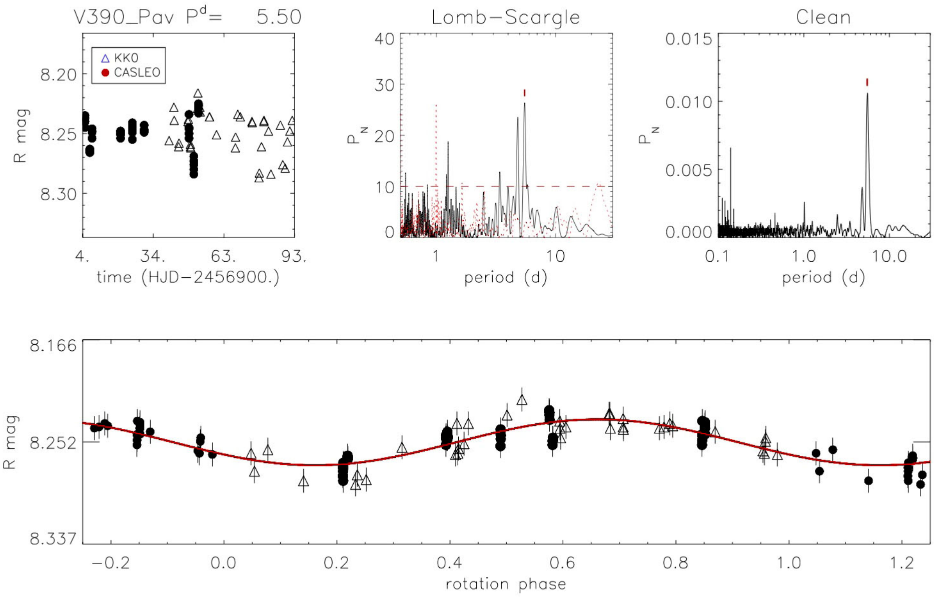

Fig. A.63. Same as in Fig. A.1 but for HIP 105441 (V390 Pav) with data collected at KKO and CASLEO.

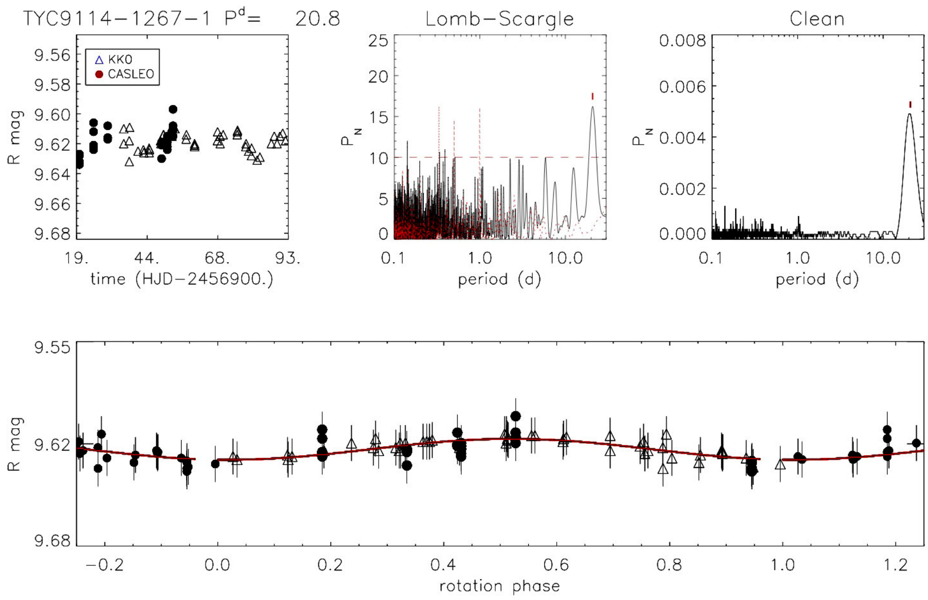

Fig. A.64. Same as in Fig. A.1 but for TYC 9114 1267 1 with data collected at KKO and CASLEO.

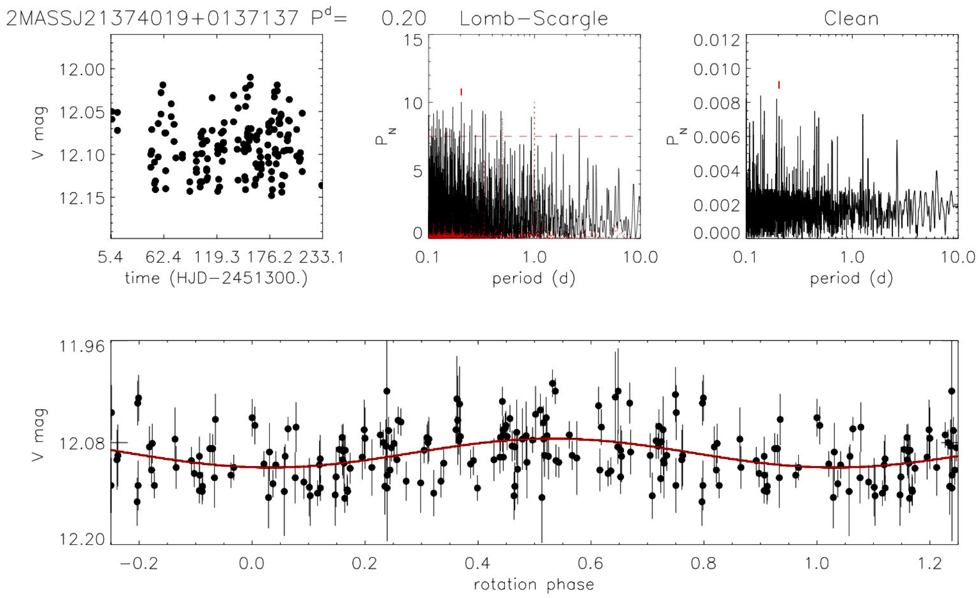

Fig. A.65. Same as in Fig. A.1 but for 2MASS J21374019+0137137AB with data collected by NSVS.

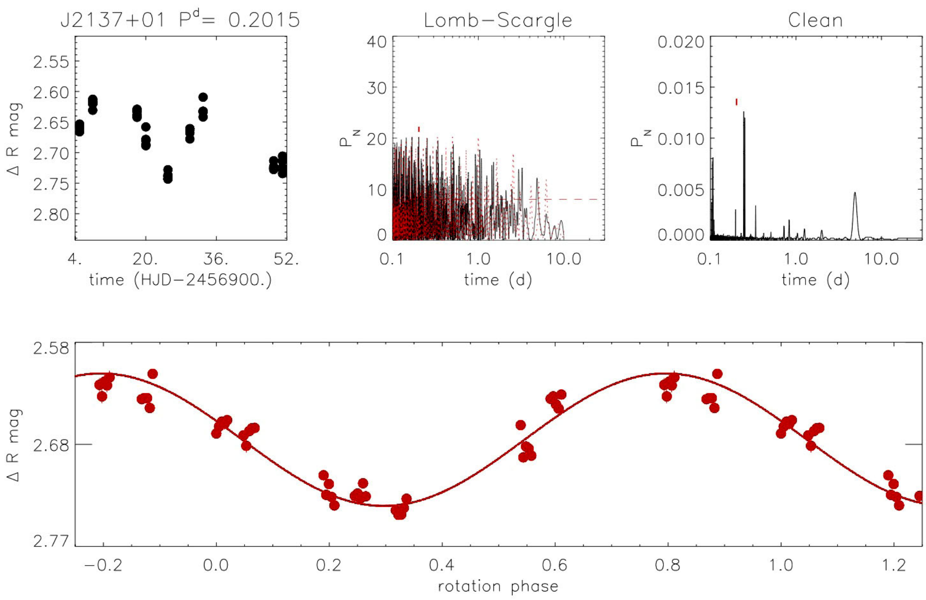

Fig. A.66. Same as in Fig. A.1 but for 2MASS J21374019+0137137AB with data collected at CASLEO.

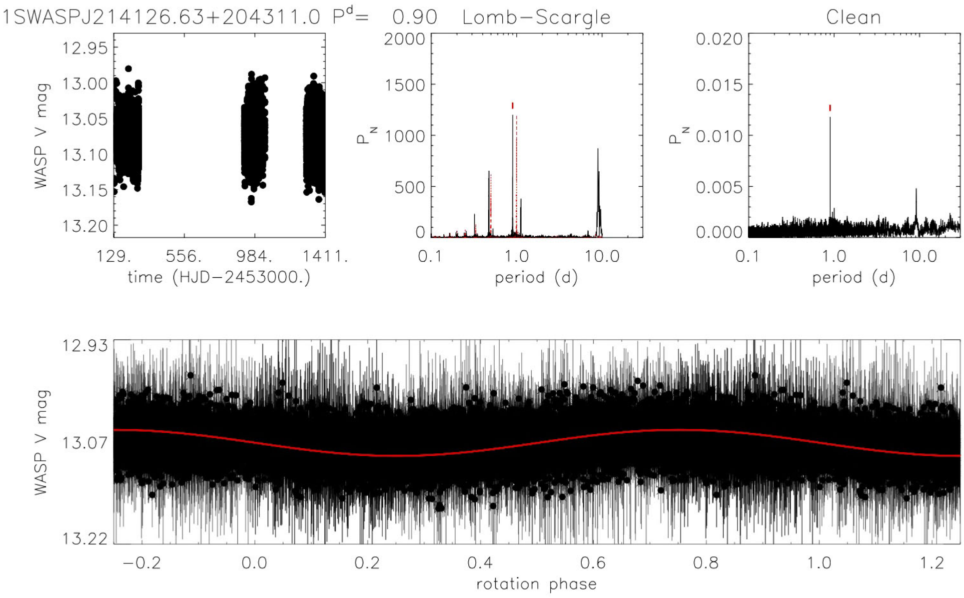

Fig. A.67. Same as in Fig. A.1 but for 2MASS J21412662+2043107 with data collected by SuperWASP.

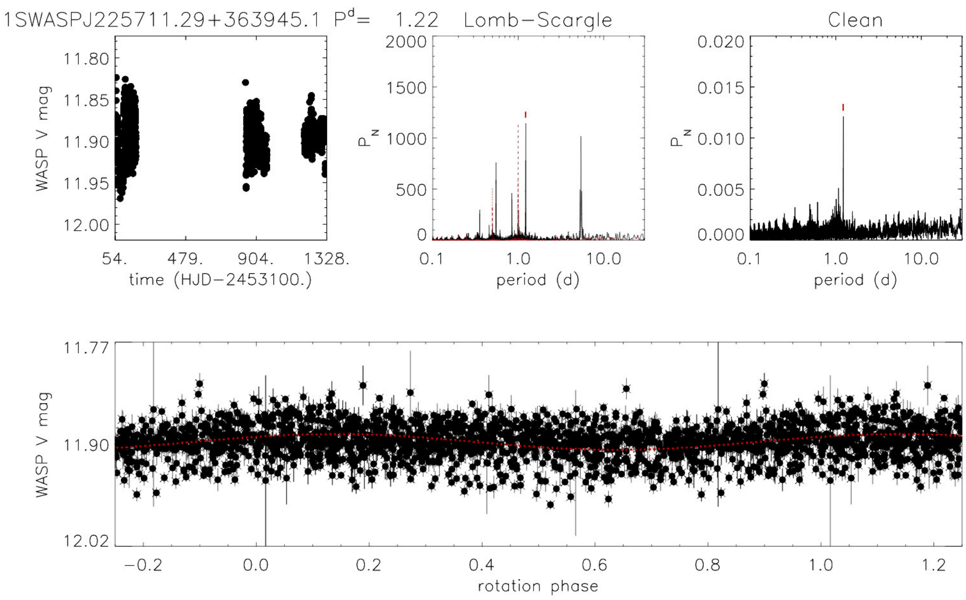

Fig. A.68. Same as in Fig. A.1 but for 2MASS J22571130+3639451 with data collected by SuperWASP.

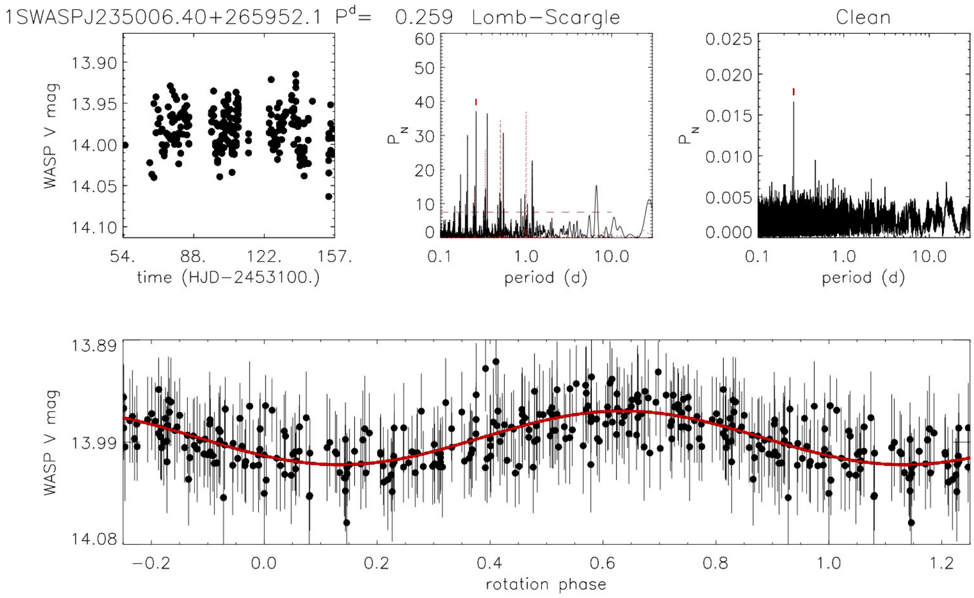

Fig. A.69. Same as in Fig. A.1 but for 2MASS J23500639+2659519 with data collected by SuperWASP.

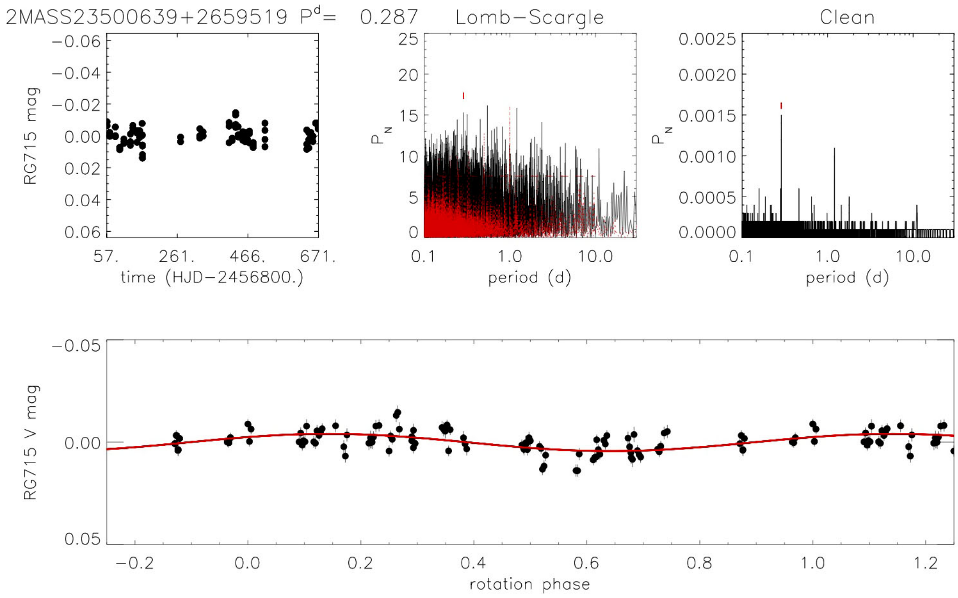

Fig. A.70. Same as in Fig. A.1 but for 2MASS J23500639+2659519 with data collected by MEarth.

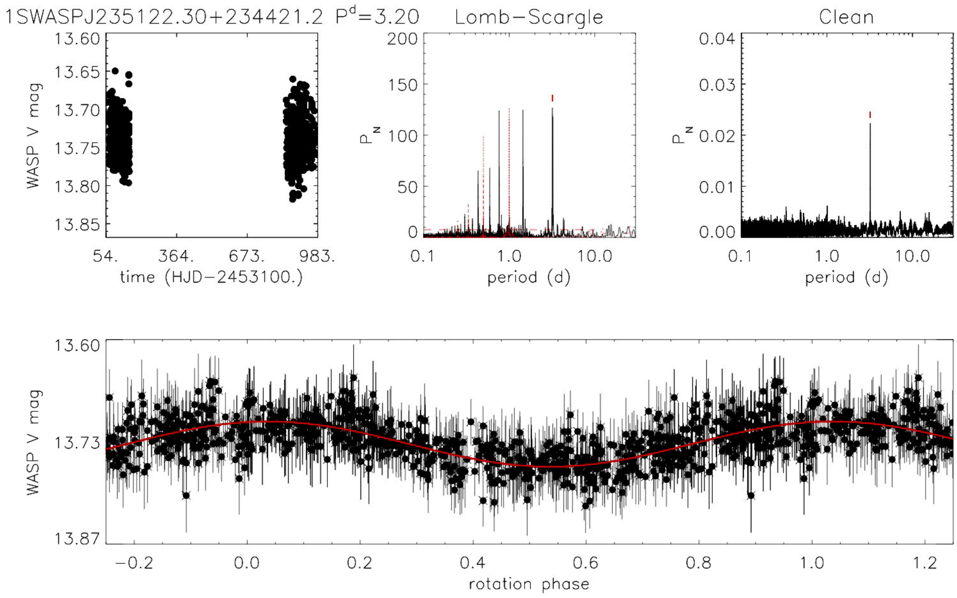

Fig. A.71. Same as in Fig. A.1 but for 2MASS J23512227+2344207 with data collected by SuperWASP.

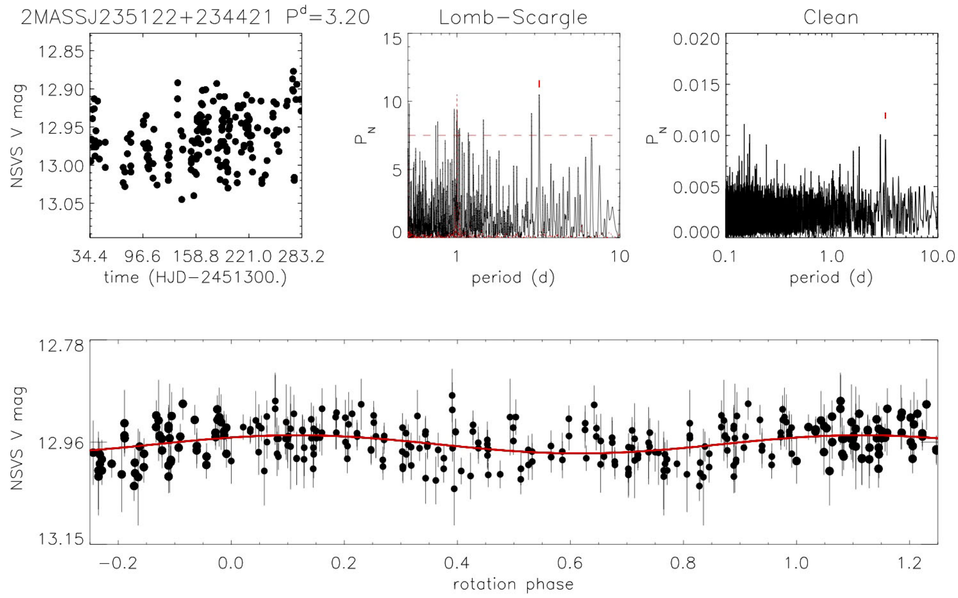

Fig. A.72. Same as in Fig. A.1 but for 2MASS J23512227+2344207 with data collected by NSVS.

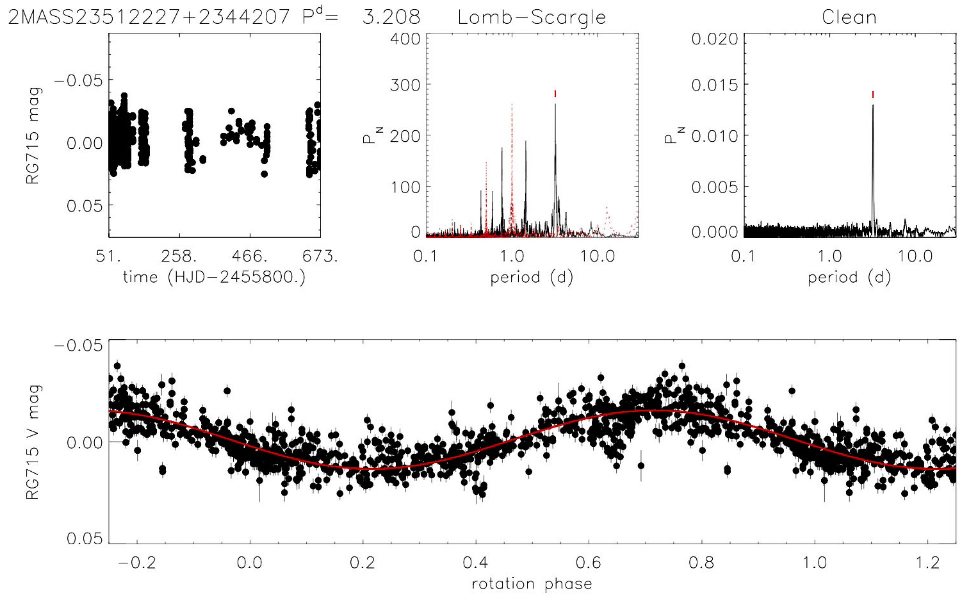

Fig. A.73. Same as in Fig. A.1 but for 2MASS J23512227+2344207 with data collected by MEarth.