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New variables in the field of the RR Lyr star WW CrA

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Abstracts: *29 new variables have been found in the field of the RR Lyr star WW CrA which has been observed from 2013 to 2017. The new variables are the following: RMH-HMB-18 (UCAC4 232-148844), RMH-HMB-19 (UCAC4 230-161913), RMH-HMB-20 (UCAC4 231-153888), RMH-HMB-21 (UCAC4 231-154077), RMH-HMB-22 (UCAC4 232-147029), RMH-HMB-23 (UCAC4 233-155707), RMH-HMB-24 (UCAC4 233-155936), RMH-HMB-25 (UCAC4 229-161252), RMH-HMB-26 (UCAC4 232-147348), RMH-HMB-27 (UCAC4 231-154898), RMH-HMB-28 (UCAC4 230-160837), RMH-HMB-29 (UCAC4 230-160877), RMH-HMB-30 (UCAC4 230-160978), RMH-HMB-31 (UCAC4 231-155216), RMH-HMB-32 (UCAC4 232-148032), RMH-HMB-33 (UCAC4 230-161242), RMH-HMB-34 (UCAC4 230-161258), RMH-HMB-35 (UCAC4 230-161340), RMH-HMB-36 (UCAC4 232-148444), RMH-HMB-37 (UCAC4 233-157277), RMH-HMB-38 (UCAC4 233-157415), RMH-HMB-39 (UCAC4 230-162017), RMH-HMB-40 (UCAC4 230-160089), RMH-HMB-41 (UCAC4 233-156541), RMH-HMB-42 (UCAC4 231-155679), RMH-HMB-43 (UCAC4 232-149041), RMH-HMB-44 (UCAC4 231-156279), RMH-HMB-45 (UCAC4 232-149297), RMH-HMB-46 (UCAC4 232-149330).*

Observations:

The observations have been conducted during a period of several years from 2013 to 2017 from the Remote Observatory Atacama Desert (ROAD) in San Pedro de Atacama, Chile. The telescope used was a 40 cm f/6.8 Optimized Dall Kirkham (ODK) from Orion Optics, UK. The CCD camera used was a FLI ML16803 with a field of view of 47 x 47 arcmin^2. The images were binned 3x3 which resulted in a pixel scale of 2.06 arcsec. Flatfielding, bias- and darkframe subtraction have been performed in the software package MAXIM/DL.

Data analysis:

Data reduction and all-star analysis has been performed with the software package VaST (http://scan.sai.msu.ru/vast/). Further analysis and reduction has been performed with programs developed by the first author (https://github.com/mrosseel/vast-automation).

Results:

The following table and figures show the results. The column Max or Min gives the magnitude for Eclipsing binaries (Min) and RR Lyr stars or other pulsating stars (Max). The period has been determined using either PERANSO (OWN) or the Lomb Scargle (LS) method and is mentioned on the images as OWN or LS which means this work. The names of the new variables have been chosen as a combination of the AAVSO observer codes (RMH for Mike Rosseel and HMB for Franz-Josef Hambsch). The adjacent number is a running number of the new variable. The given

coordinates are the ones of the UCAC4 database. The VSX (dated May 18, 2020) has been consulted to check whether the new variables are not known yet.

Name (UCAC4)	RA2000	DEC2000	Mag. Range V	Type	Max or Min	Epoch	Period (days)	Light curve
RMH-HMB-18 (232-148844)	18 07 23.61	-43 36 26.09	12.65-13.18	L				Fig. 1
RMH-HMB-19 (230-161913)	18 07 24.00	-44 03 21.02	14.4-14.8	EA	14.8	2456819.2	4.65500	Fig. 2
RMH-HMB-20 (231-153888)	18 03 16.84	-43 53 42.98	12.65-13.18	L				Fig. 3
RMH-HMB-21 (231-154077)	18 03 38.37	-43 58 07.47	14.1-14.4	L				Fig. 4
RMH-HMB-22 (232-147029)	18 03 50.98	-43 42 09.37	12.6-13.3	L				Fig. 5
RMH-HMB-23 (233-155707)	18 04 04.30	-43 32 58.47	12.80-13.00	EW	12.95	2456817.583	0.29484	Fig. 6
RMH-HMB-24 (233-155936)	18 04 27.91	-43 34 46.02	13.10-13.25	L				Fig. 7
RMH-HMB-25 (229-161252)	18 04 28.96	-44 12 34.73	12.6-12.8	?				Fig. 8
RMH-HMB-26 (232-147348)	18 04 33.23	-43 40 37.39	13.10-13.25	L				Fig. 9
RMH-HMB-27 (231-154898)	18 05 09.17	-43 55 06.52	13.1-13.2	L				Fig. 10
RMH-HMB-28 (230-160837)	18 05 20.23	-44 04 07.49	11.45-11.55	L				Fig. 11
RMH-HMB-29 (230-160877)	18 05 24.14	-44 06 24.39	13.00-13.15	L				Fig. 12
RMH-HMB-30 (230-160978)	18 05 36.28	-44 10 54.69	15.8-16.8	RRC	15.8	2456817.583	0.09338	Fig. 13
RMH-HMB-31 (231-155216)	18 05 43.80	-43 56 02.03	12.3-12.5	L				Fig. 14
RMH-HMB-32 (232-148032)	18 05 47.81	-43 46 06.13	15.9-17.2	EW	17.2	2456817.415	0.29590	Fig. 15
RMH-HMB-33 (230-161242)	18 06 07.18	-44 00 04.72	14.8-15.4	?	15.4	2456816.0	20.64	Fig. 16
RMH-HMB-34 (232-161258)	18 06 08.34	-44 03 01.08	13.6-13.9	L				Fig. 17
RMH-HMB-35 (230-161340)	18 06 18.21	-44 05 01.37	13.5-13.7	L				Fig. 18
RMH-HMB-36 (232-148444)	18 06 33.98	-43 46 38.86	15.3-16.1	DSCT	15.3	2456817.744	0.07139	Fig. 19
RMH-HMB-37 (233-157277)	18 06 52.35	-43 33 32.10	13.3-13.6	RRC	13.7	2456817.33	0.17822	Fig. 20
RMH-HMB-38 (233-157415)	18 07 07.57	-43 34 31.40	13.25-13.60	L				Fig. 21
RMH-HMB-39 (230-162017)	18 07 36.75	-44 05 14.51	11.9-12.0	L				Fig. 22
RMH-HMB-40 (230-160089)	18 03 52.92	-44 04 20.38	16.0-17.2	EW	17.20	2456817.47	0.39657	Fig. 23
RMH-HMB-41 (233-156541)	18 05 33.15	-43 28 05.79	13.35-13.6	L				Fig. 24
RMH-HMB-42 (231-155679)	18 06 38.32	-43 52 28.41	15.0-15.9	EW	15.9	2456817.47	1.63702	Fig. 25
RMH-HMB-43 (232-149041)	18 07 43.39	-43 41 37.20	12.15-12.40	L				Fig. 26
RMH-HMB-44	18 07 49.74	-43 56 47.03	14.55-14.95	RRAB	14.55	2456817.47	0.57814	Fig. 27

(231-156279)								
RMH-HMB-45 (232-149297)	18 07 56.18	-43 43 56.94	12.0-12.5	L				Fig. 28
RMH-HMB-46 (232-149330)	18 07 56.98	-43 46 52.36	13.914.4	EW	14.4	2456817.47	0.18449	Fig. 29

Table 1: Information about the new variables

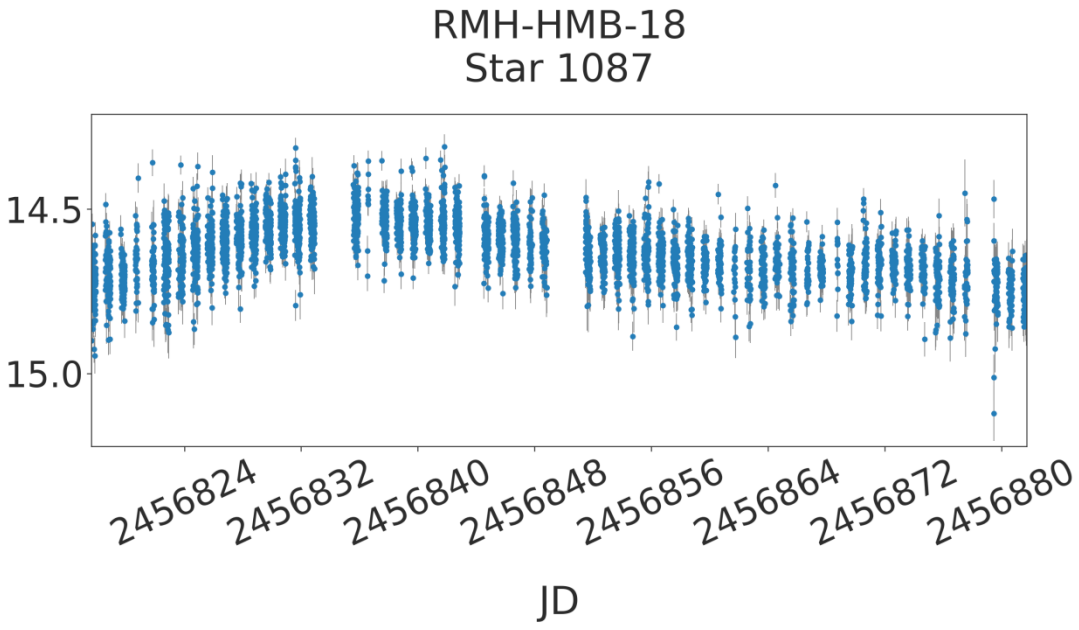

Fig. 1: Light curve of RMH-HMB-18, type L

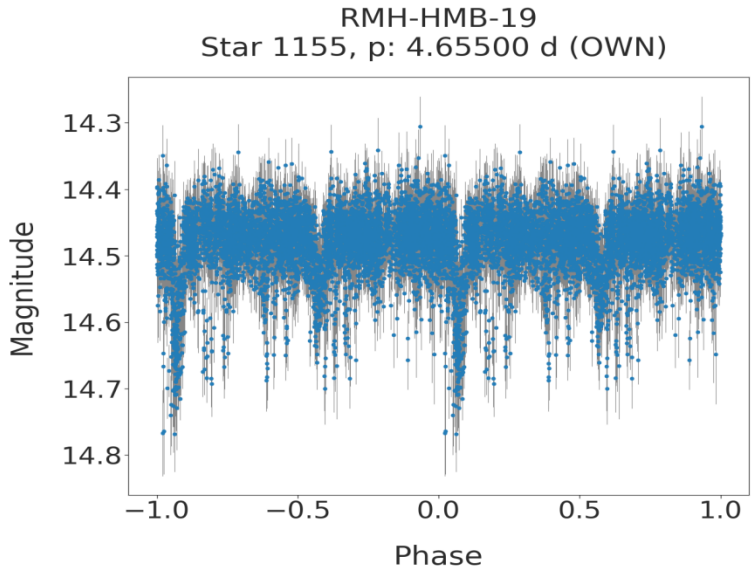

Fig. 2: Phase diagram of RMH-HMB-19, type EA, epoch 2456819.2, period 4.655 d

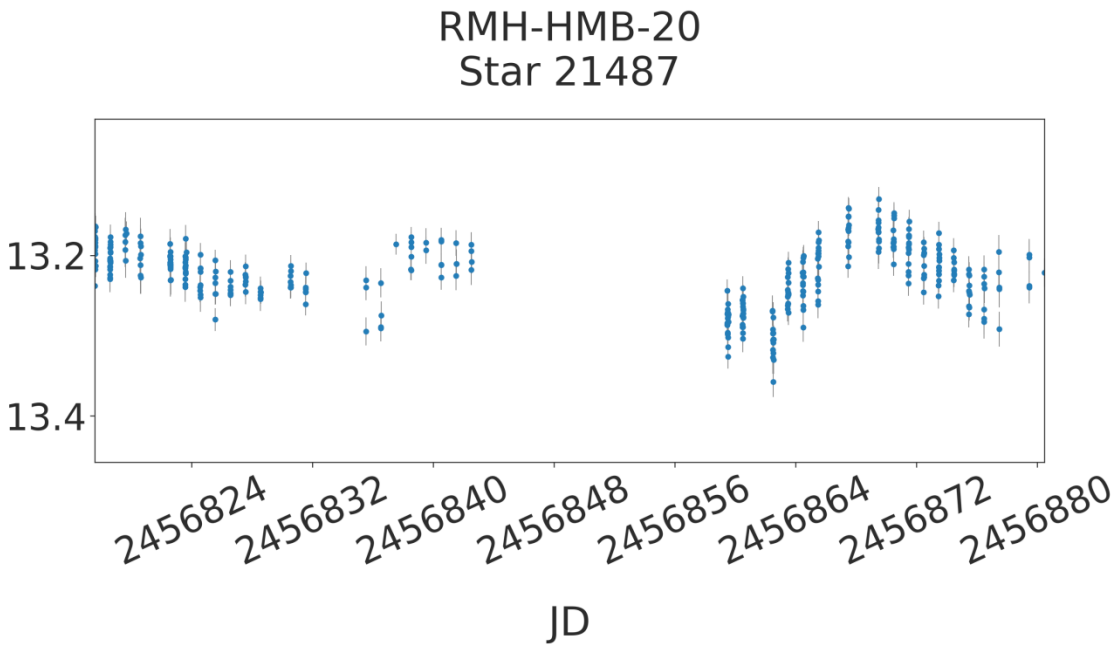

Fig. 3: Light curve of RMH-HMB-20, type L

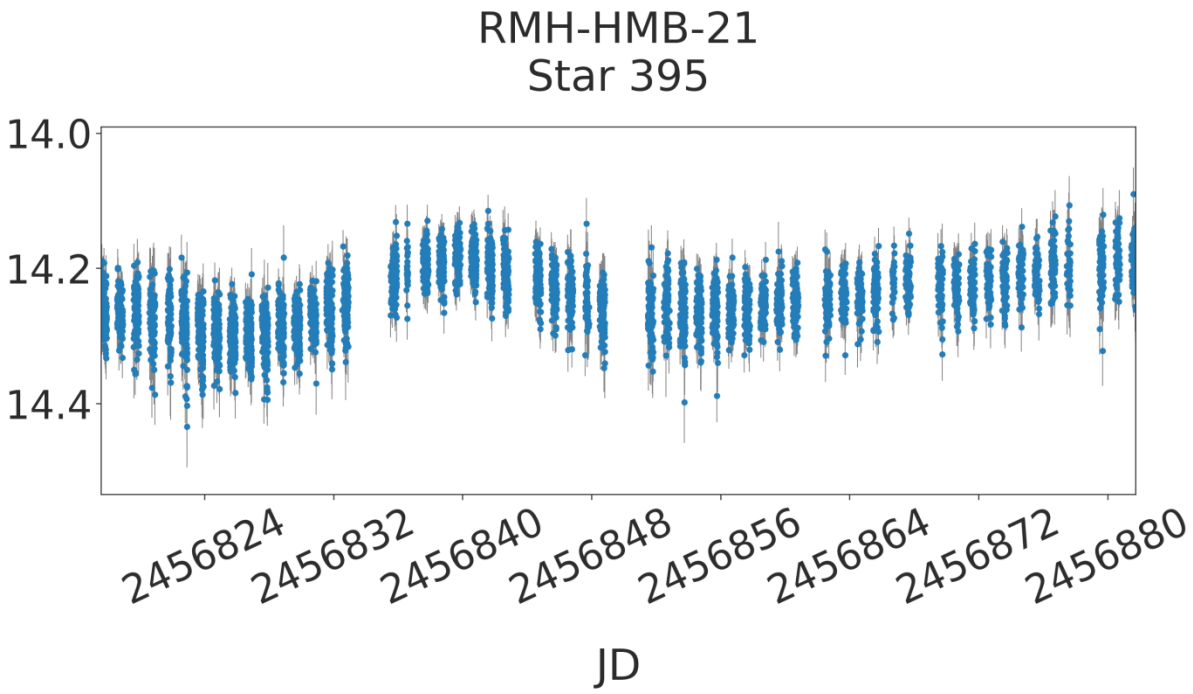

Fig. 4: Light curve of RMH-HMB-21, type L

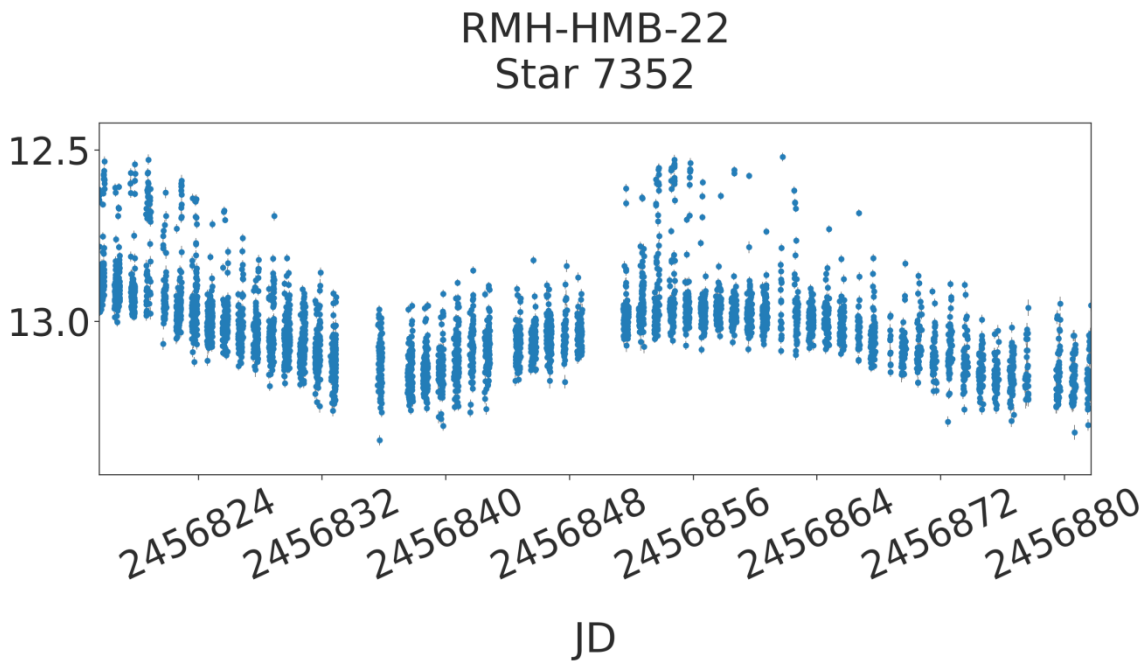

Fig. 5: Light curve of RMH-HMB-22, type L

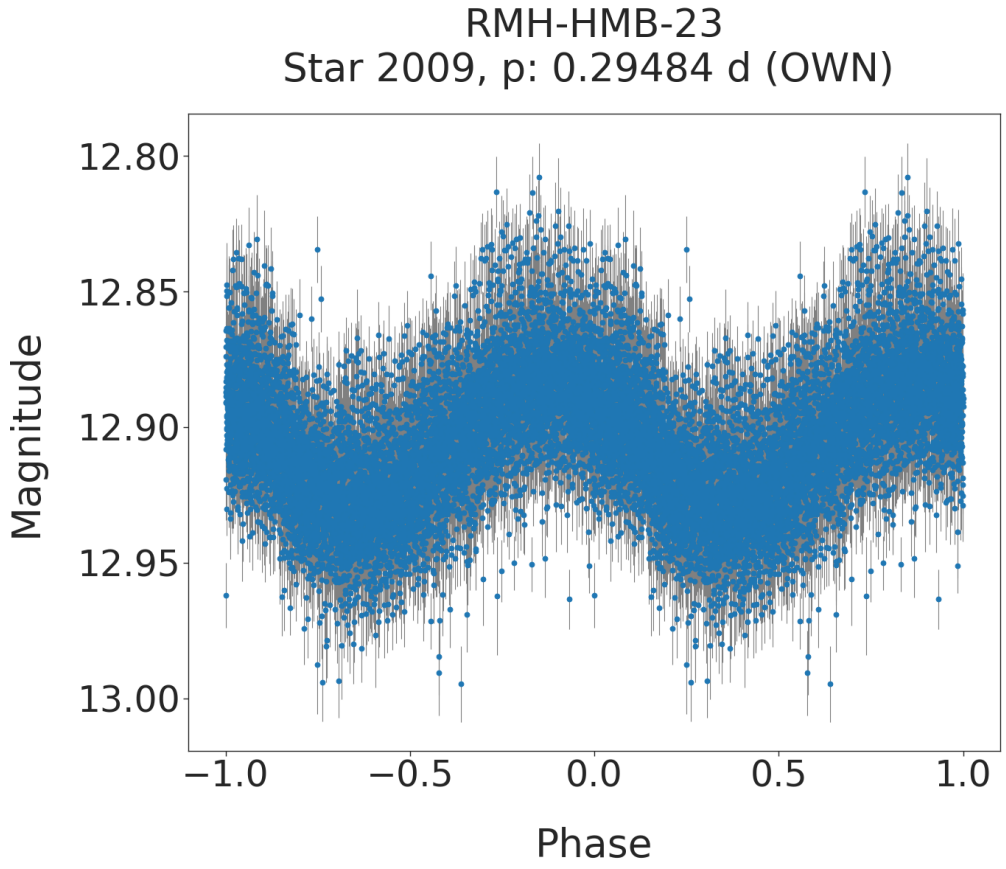

Fig. 6: Phase diagram of RMH-HMB-23, type EW, Epoch 2456817.583, period 0.29484 d

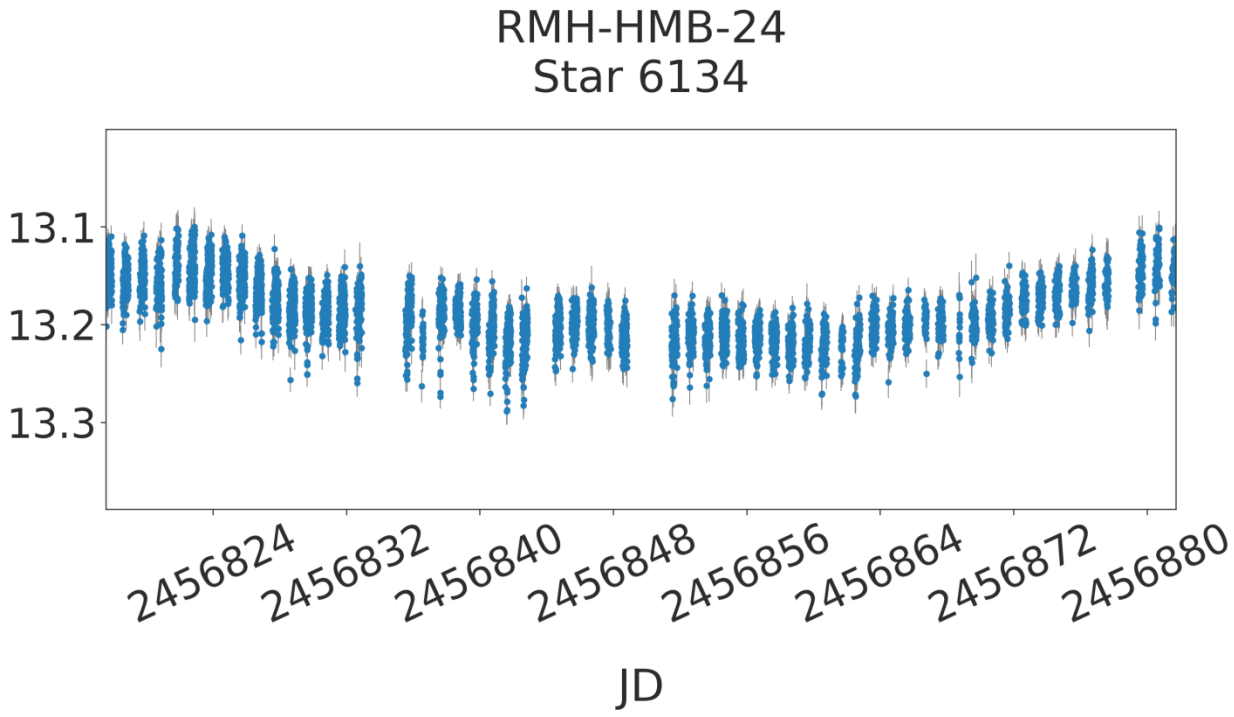

Fig. 7: Light curve of RMH-HMB-24, type L

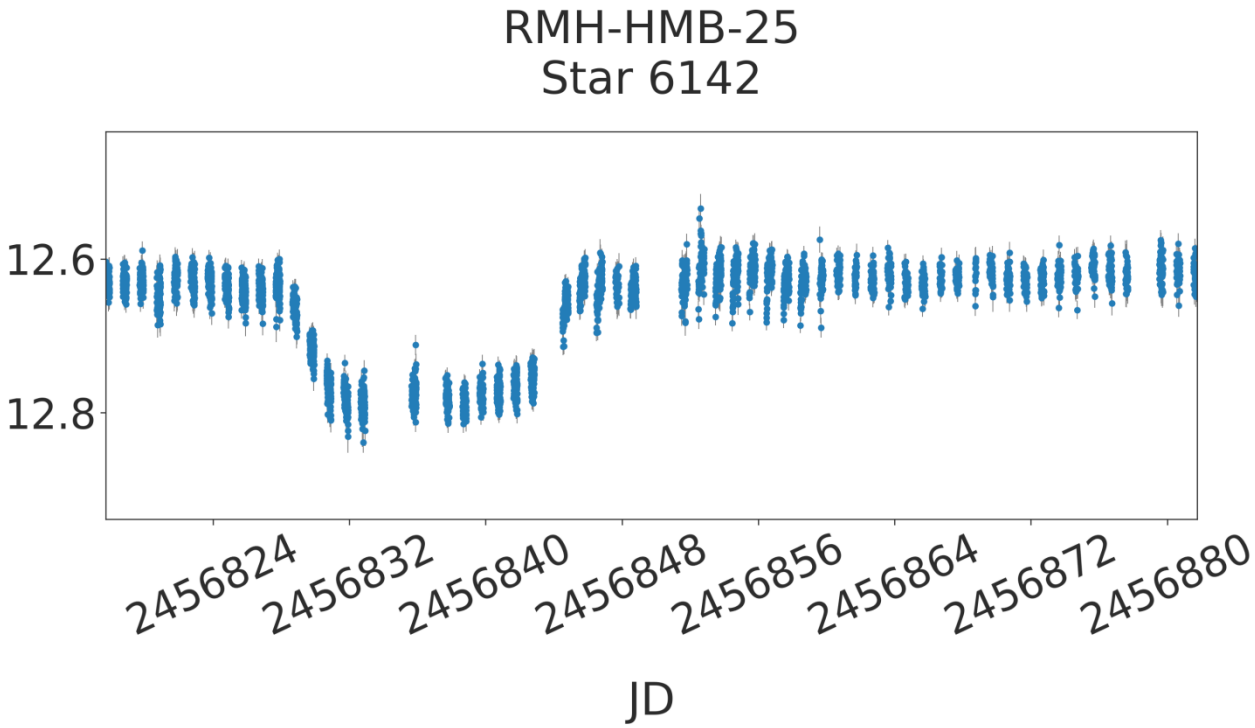

Fig. 8: Light curve of RMH-HMB-25, type ?

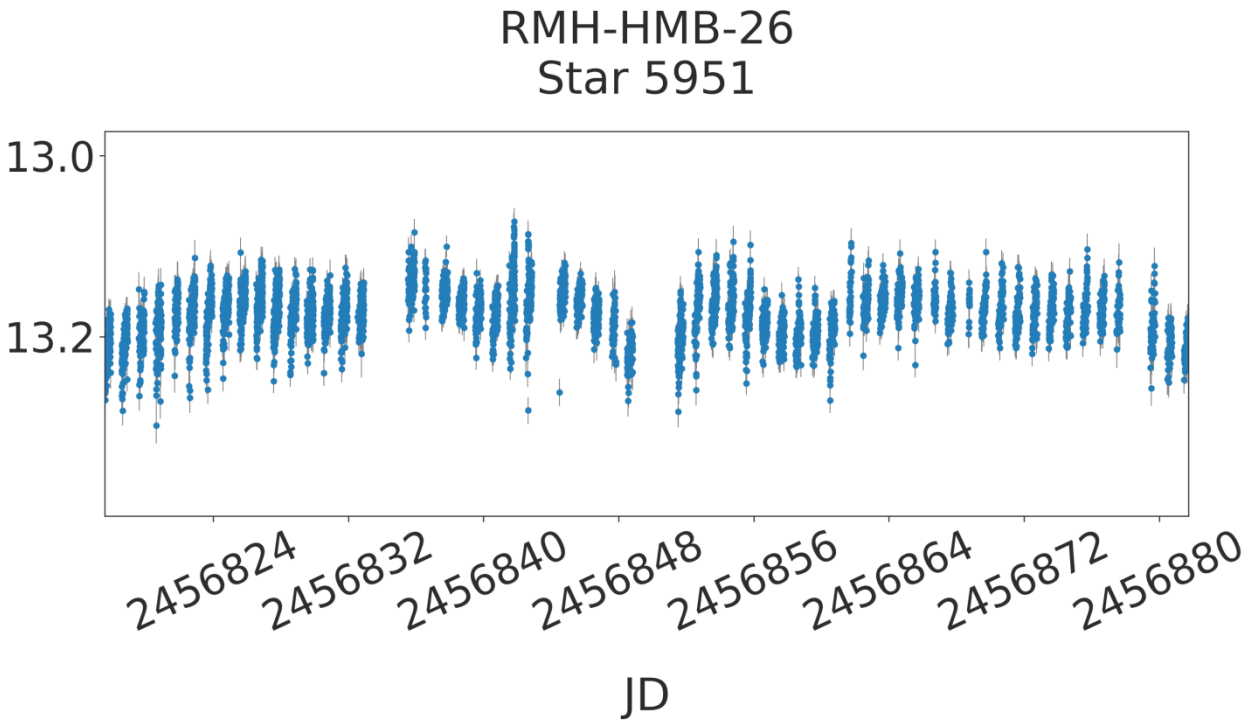

Fig. 9: Light curve of RMH-HMB-26, type L

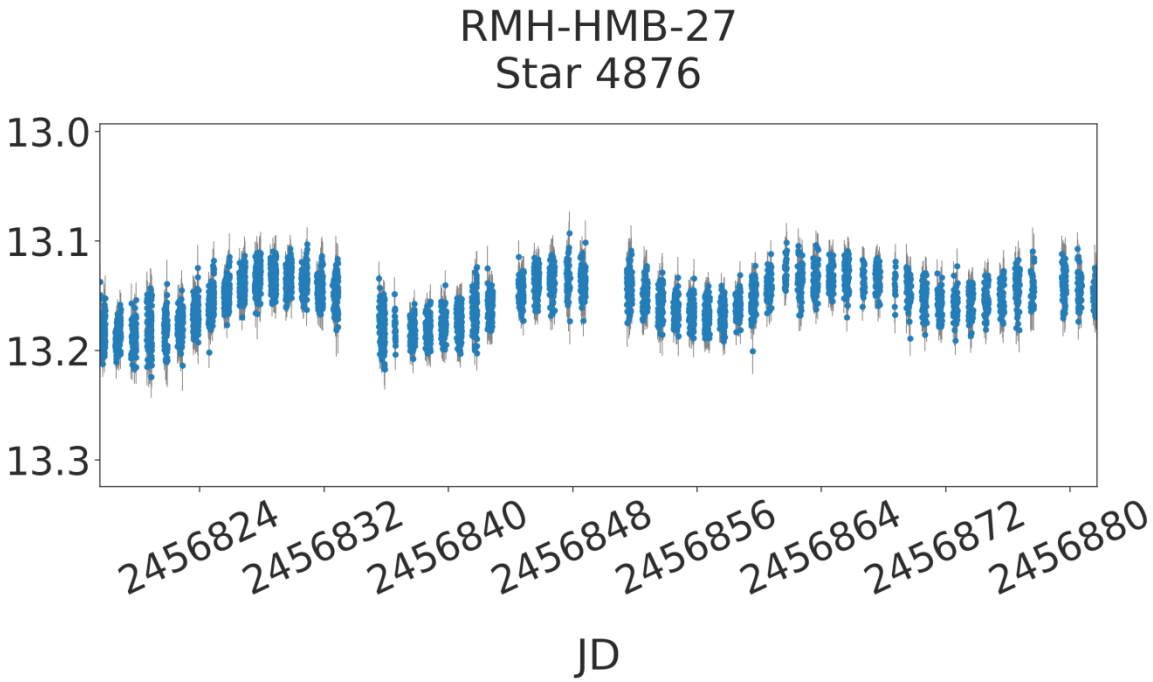

Fig. 10: Light curve of RMH-HMB-27, type L

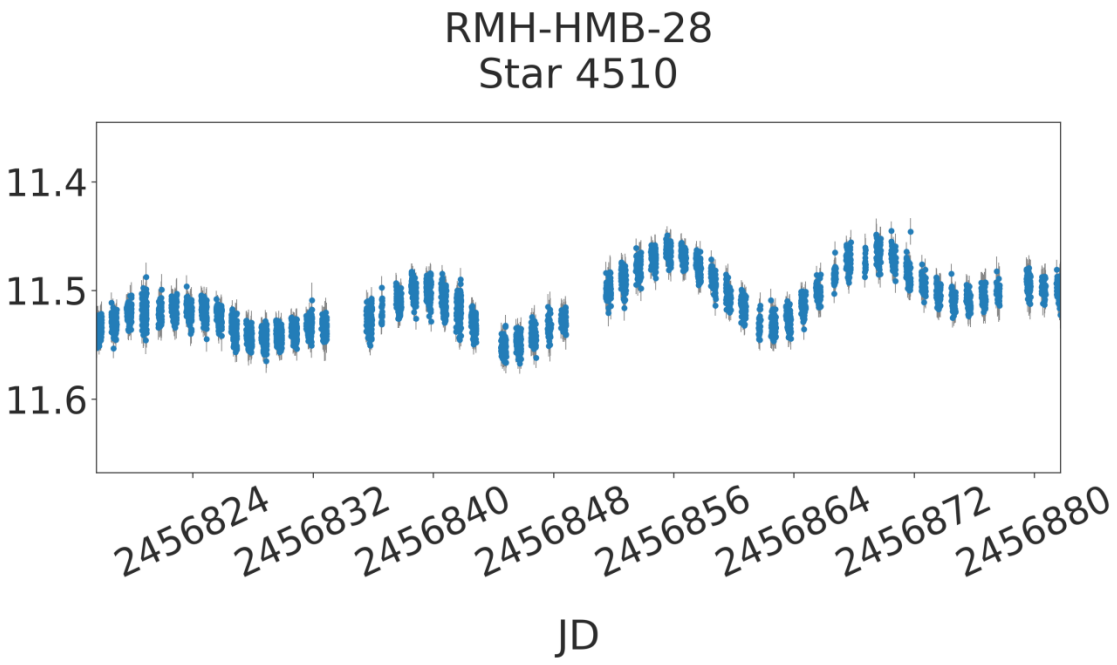

Fig. 11: Light curve of RMH-HMB-28, type L

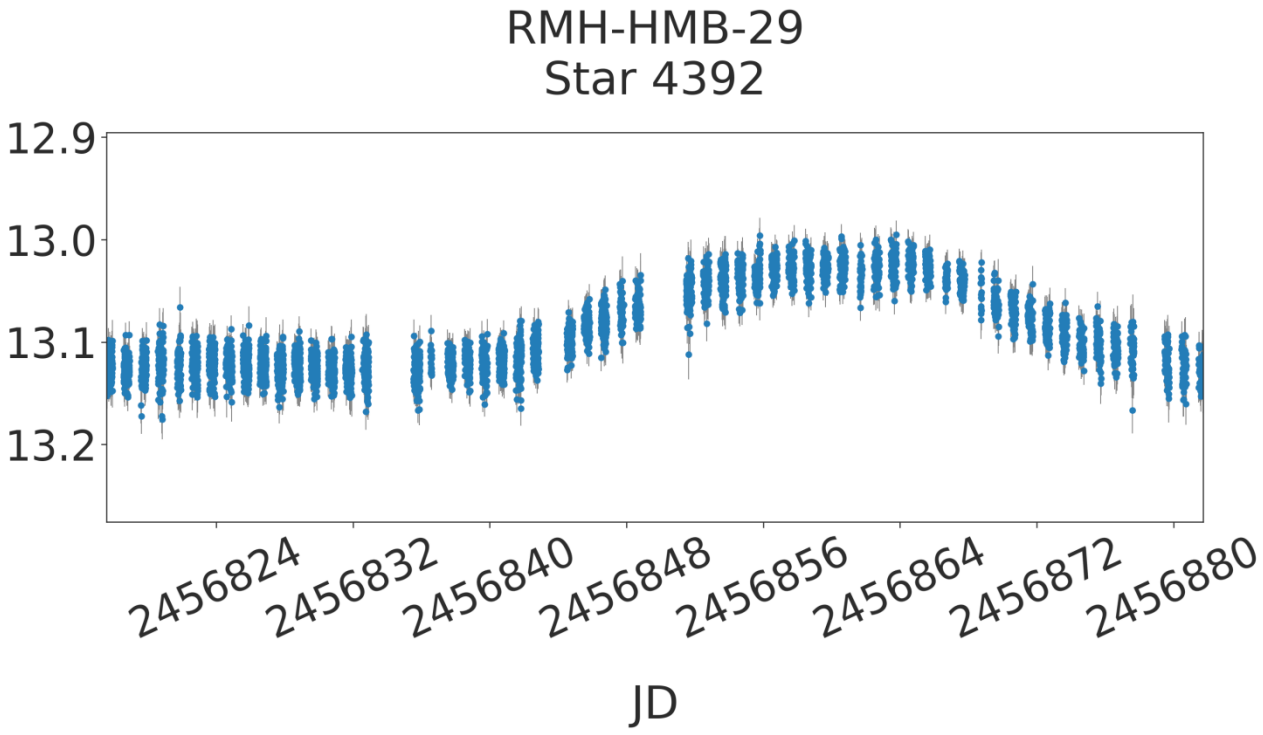

Fig. 12: Light curve of RMH-HMB-29, type L

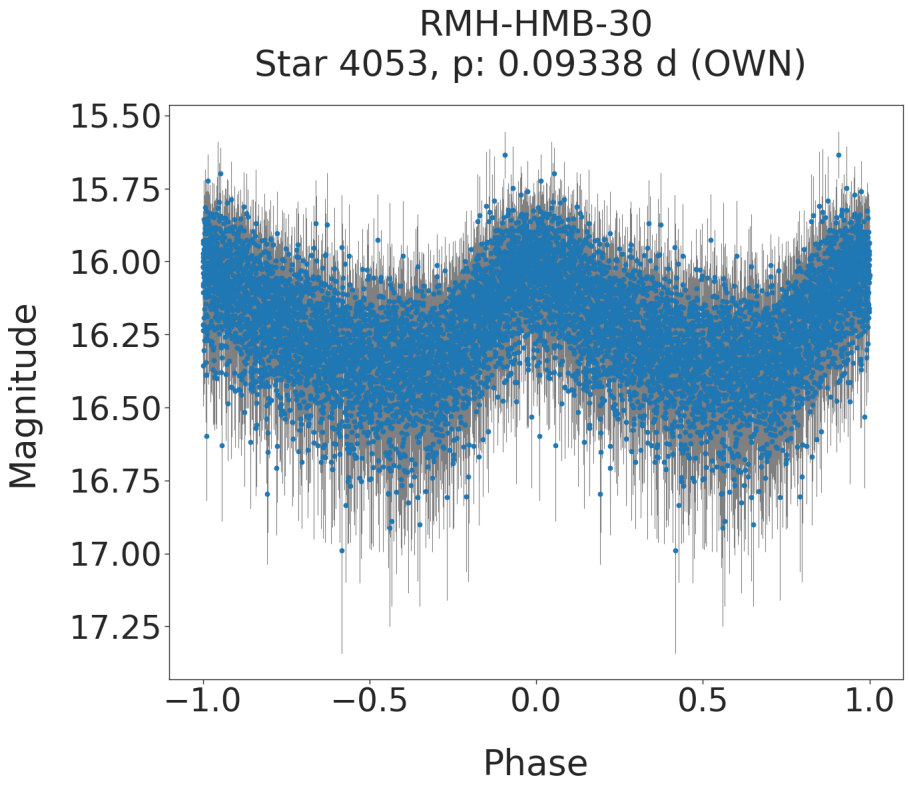

Fig. 13: Phase diagram of RMH-HMB-30, type RRC, epoch 2456817.583, period 0. 09338 d

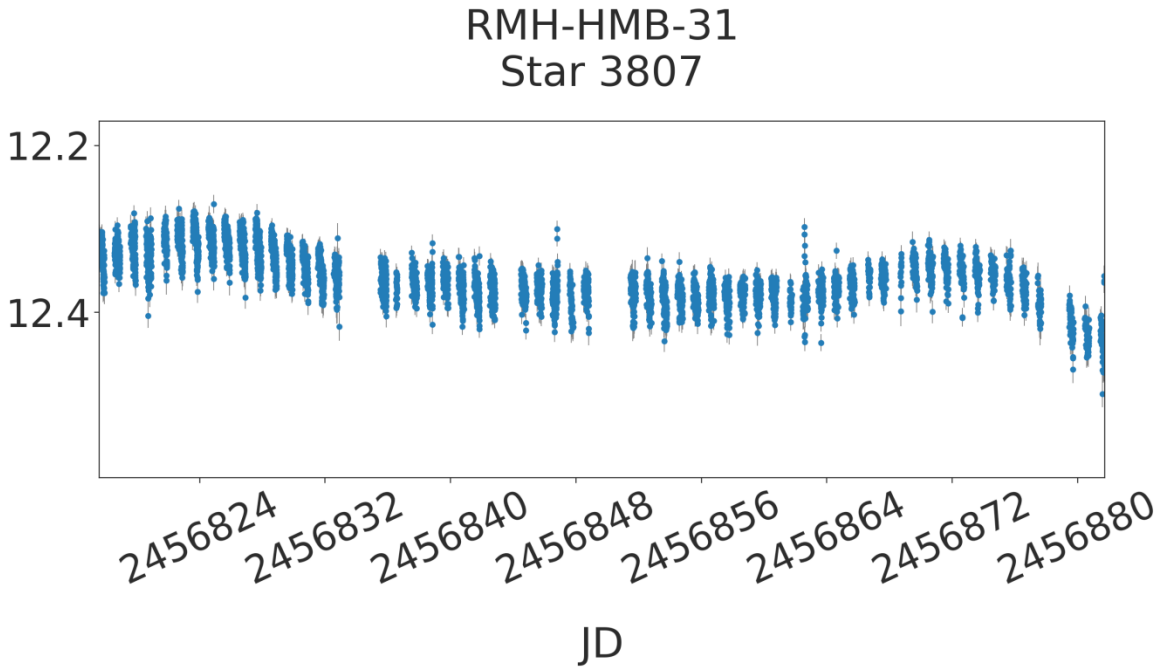

Fig. 14: Light curve of RMH-HMB-31, type L

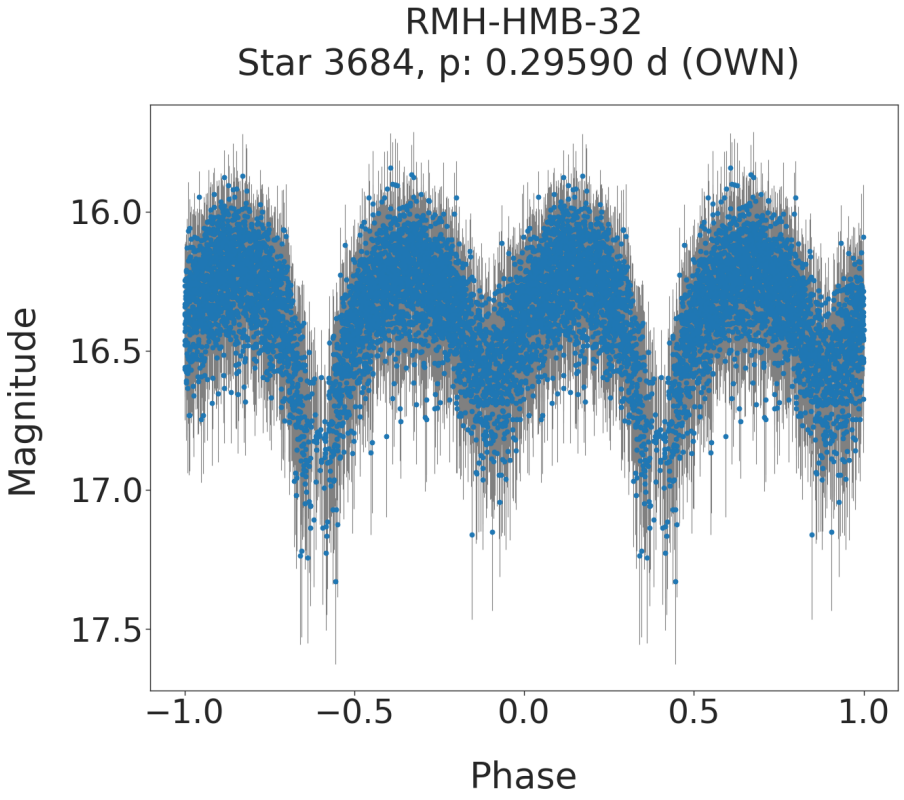

Fig. 15: Phase diagram of RMH-HMB-32, type EW, epoch 2456817.415, period 0.2959 d

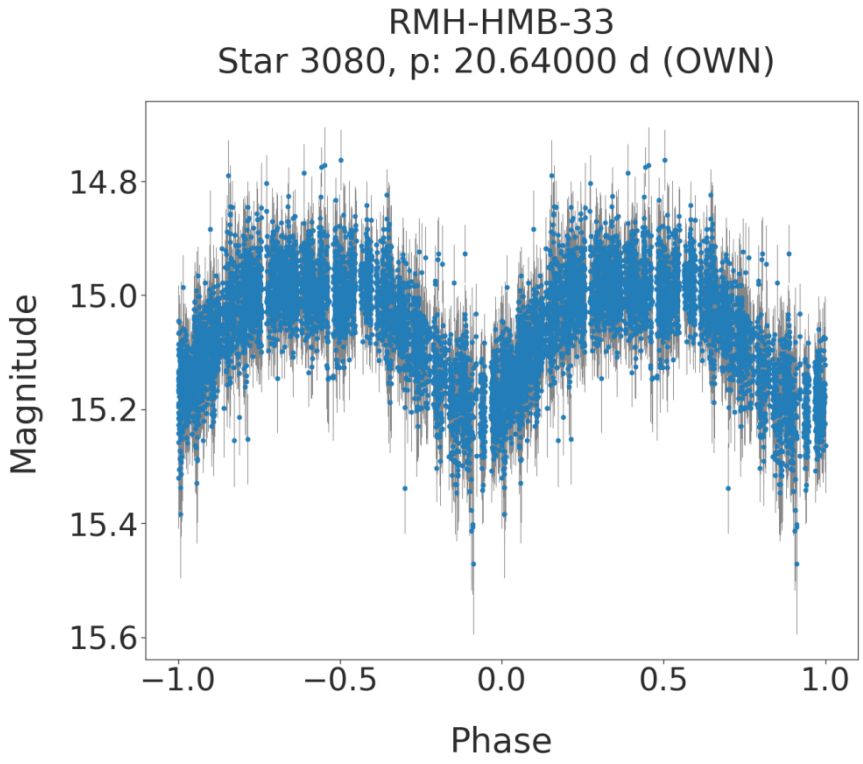

Fig. 16: Phase diagram of RMH-HMB-33, type ?, epoch 2456816.0, period 20.64 d

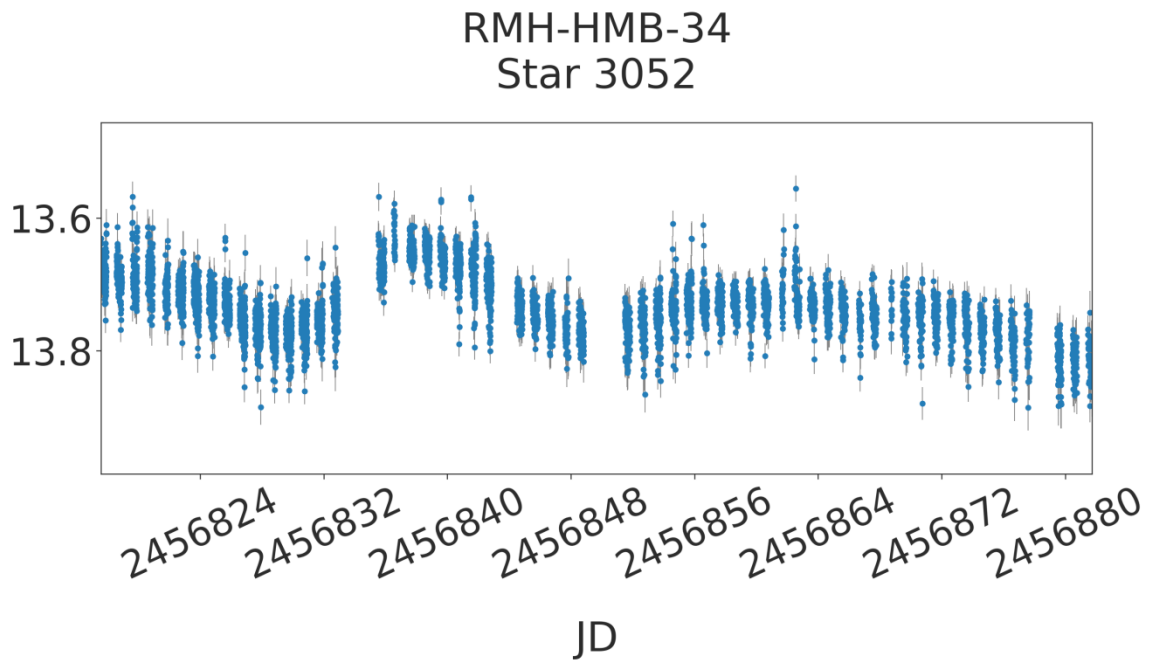

Fig. 17: Light curve of RMH-HMB-34, type L

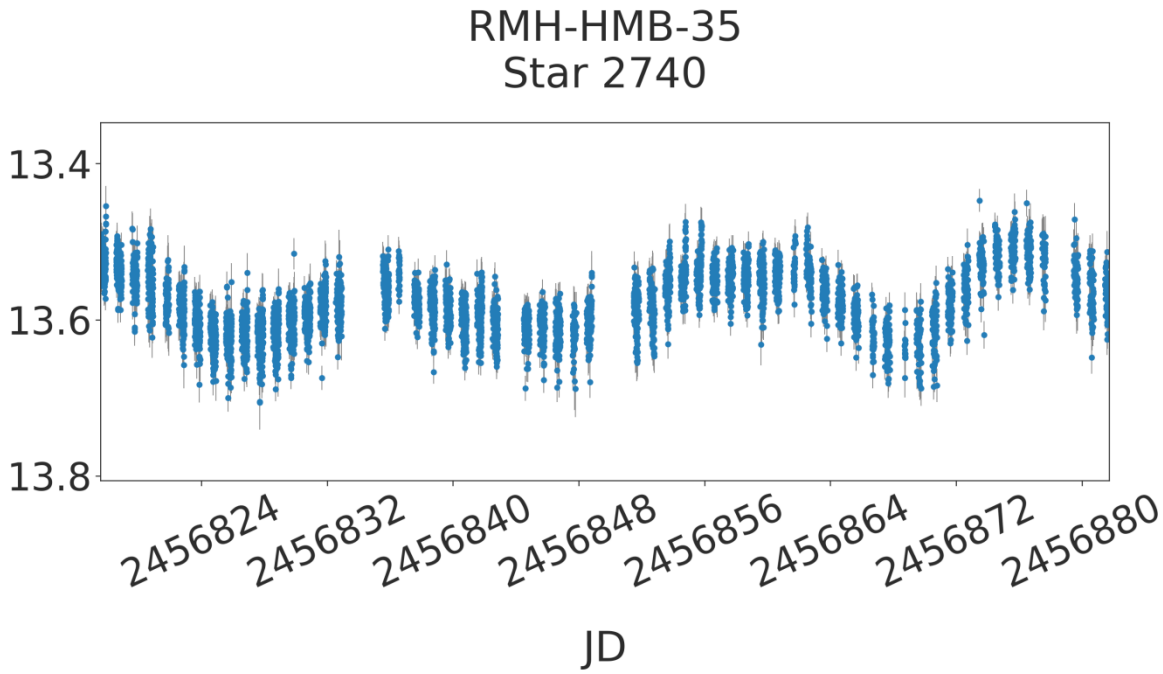

Fig. 18: Light curve of RMH-HMB-35, type L

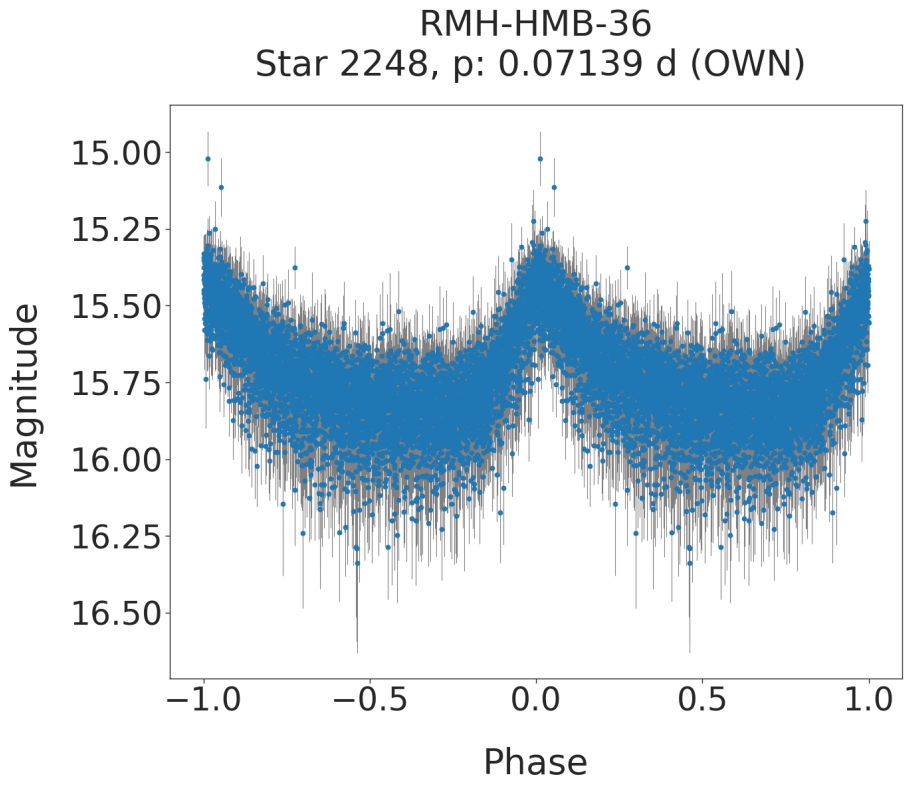

Fig. 19: Phase diagram of RMH-HMB-36 type DSCT, epoch 2456817.744, period 0.07139 d

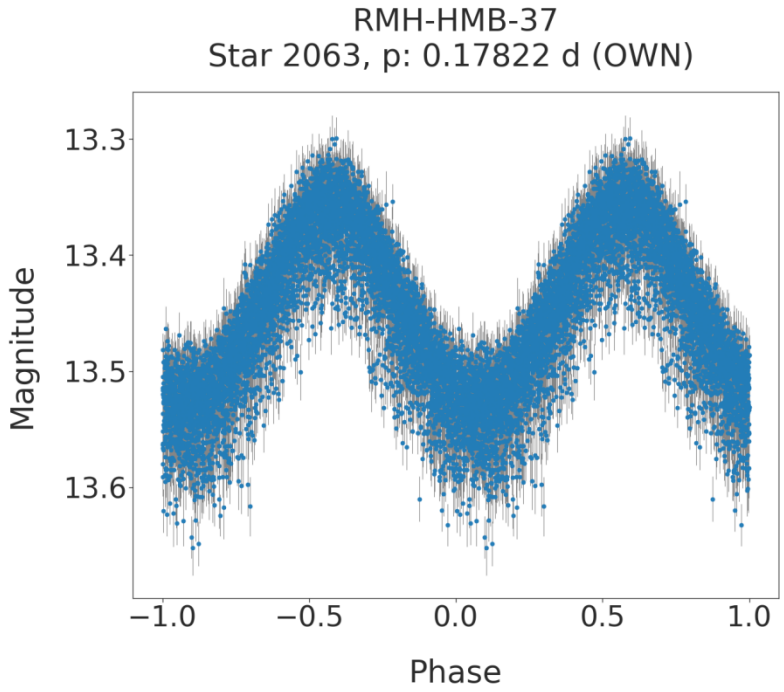

Fig. 20: Phase diagram of RMH-HMB-37 type RRC, epoch 2456817.33, period 0.17822 d

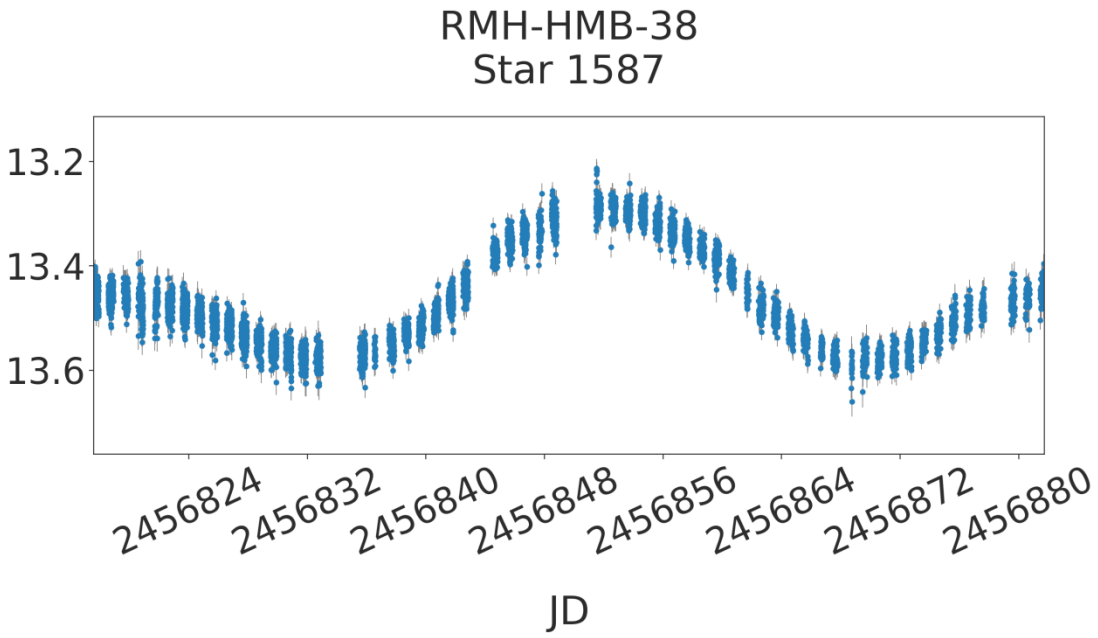

Fig. 21: Light curve of RMH-HMB-38, type L

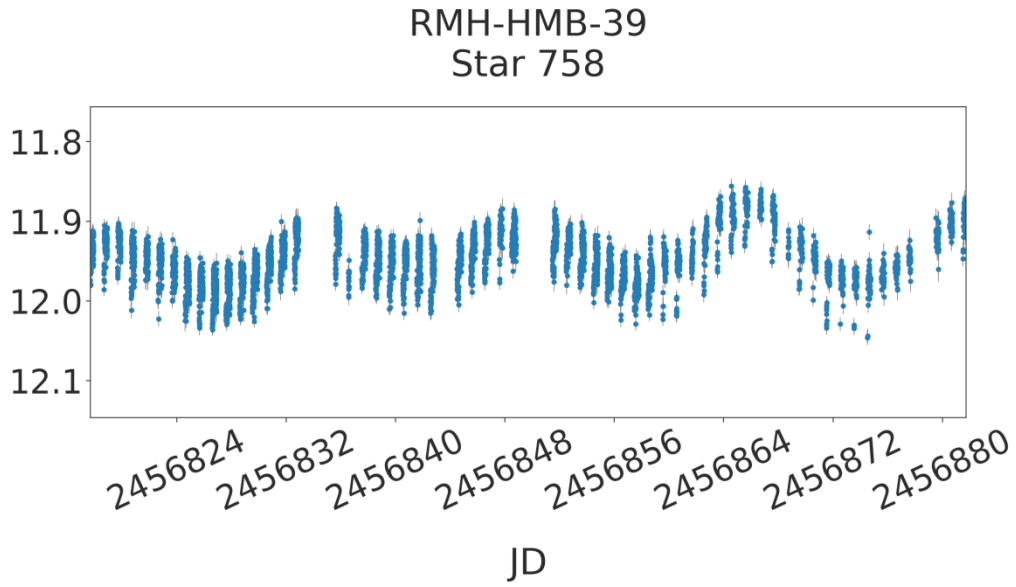

Fig. 22: Light curve of RMH-HMB-39, type L

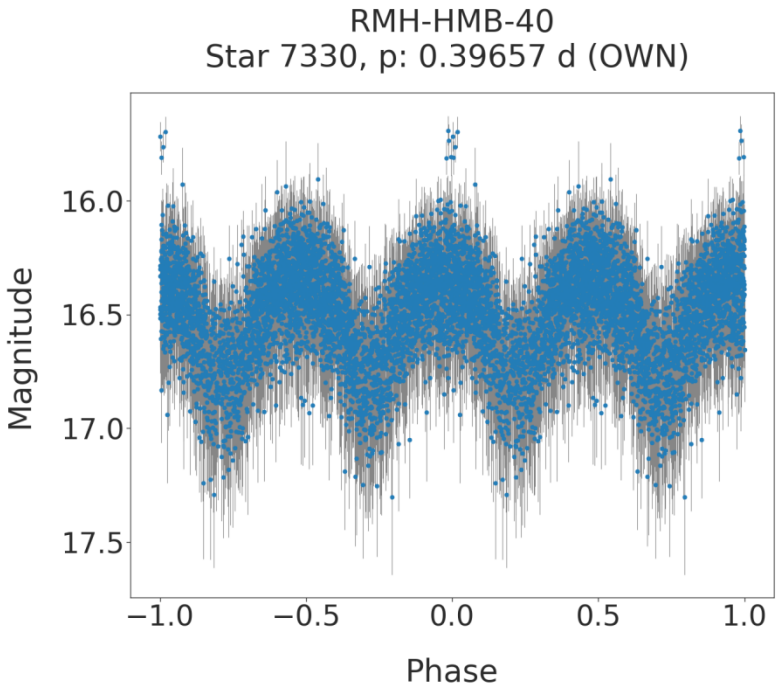

Fig. 23: Phase diagram of RMH-HMB-40, type EW, epoch 2456817.47, period 0.39657 d

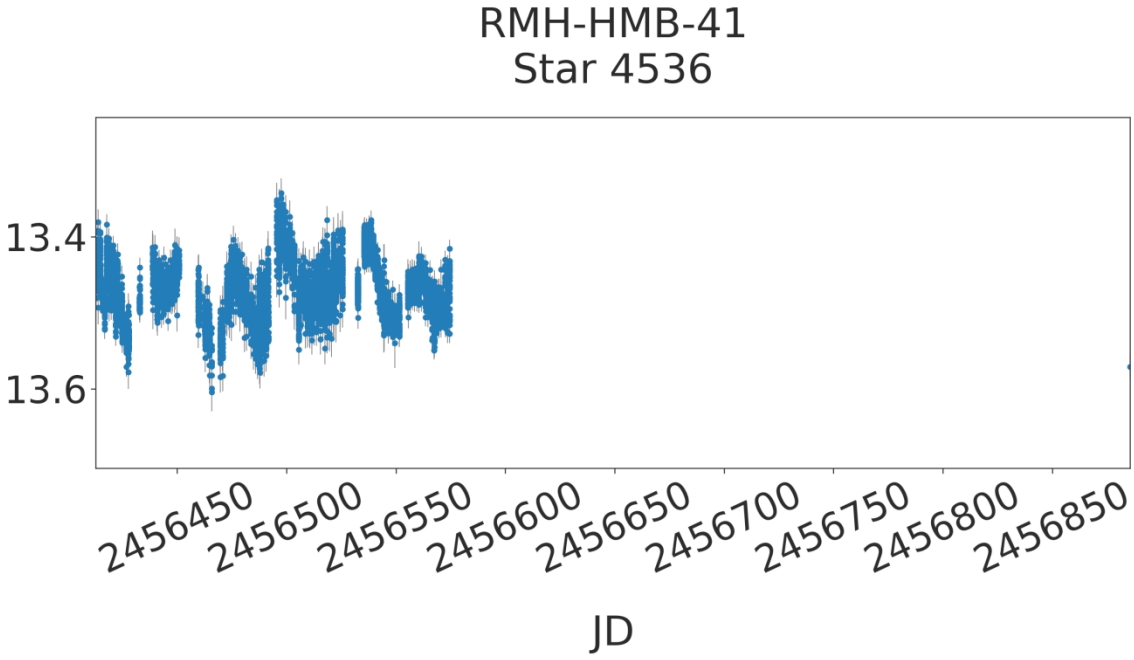

Fig. 24: Phase diagram of RMH-HMB-41, type ?

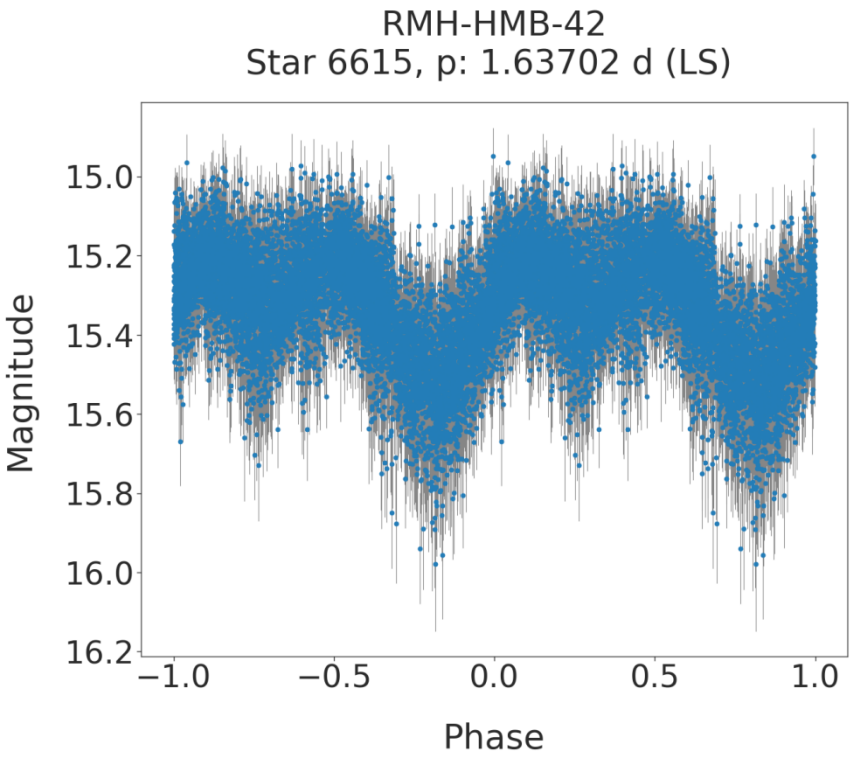

Fig. 25: Phase diagram of RMH-HMB-42, type EW, epoch 2456817.47, period 1.63702 d

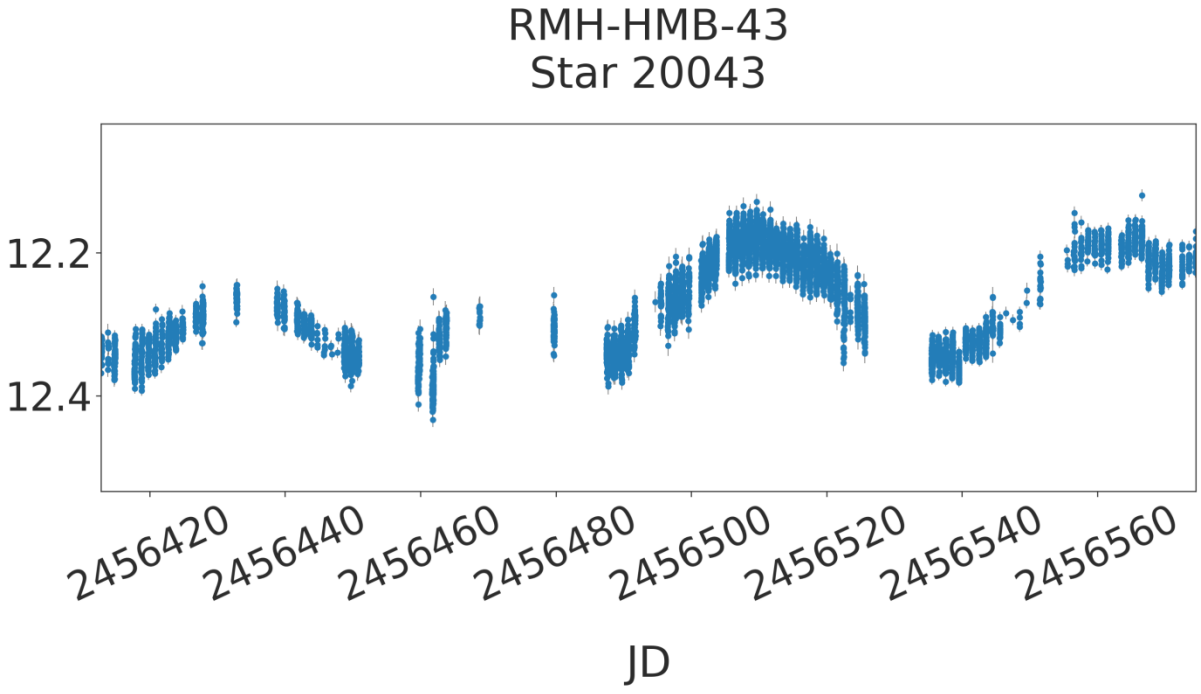

Fig. 26: Light curve of RMH-HMB-43, type L

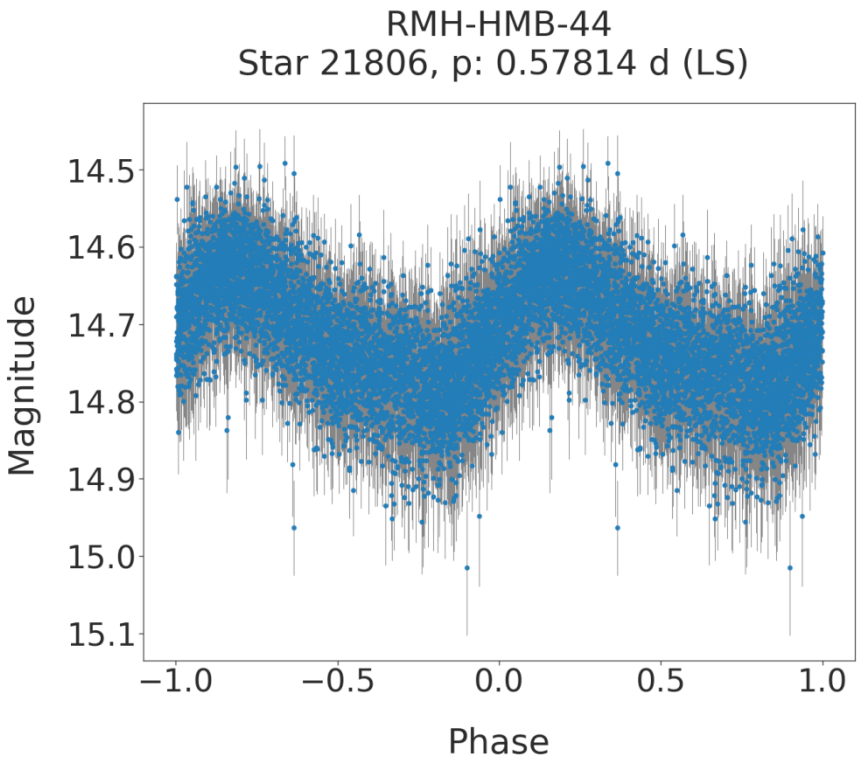

Fig. 27: Phase diagram of RMH-HMB-44, type RRAB, epoch 2456817.47, period 0.57814 d

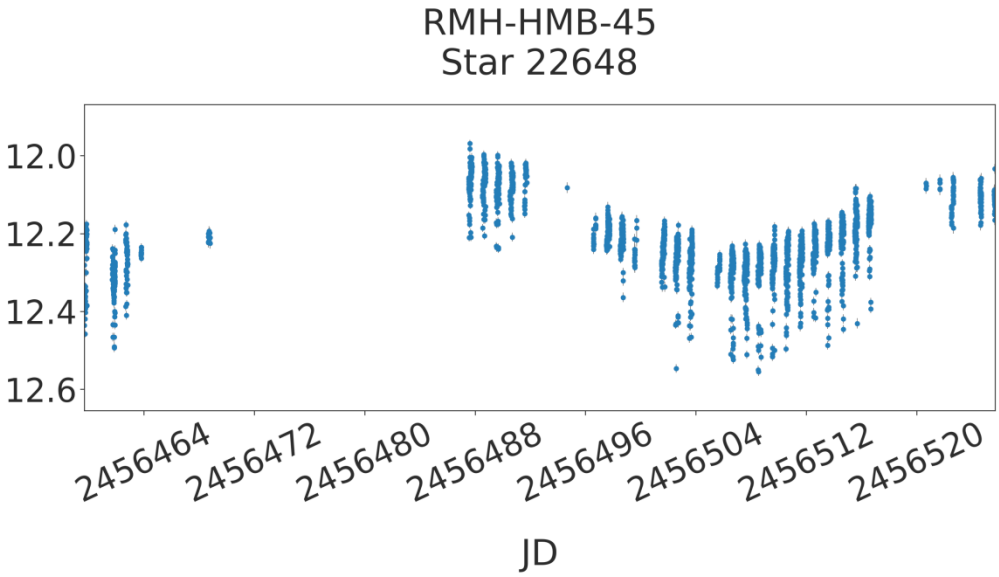

Fig. 28: Light curve of RMH-HMB-45, type L

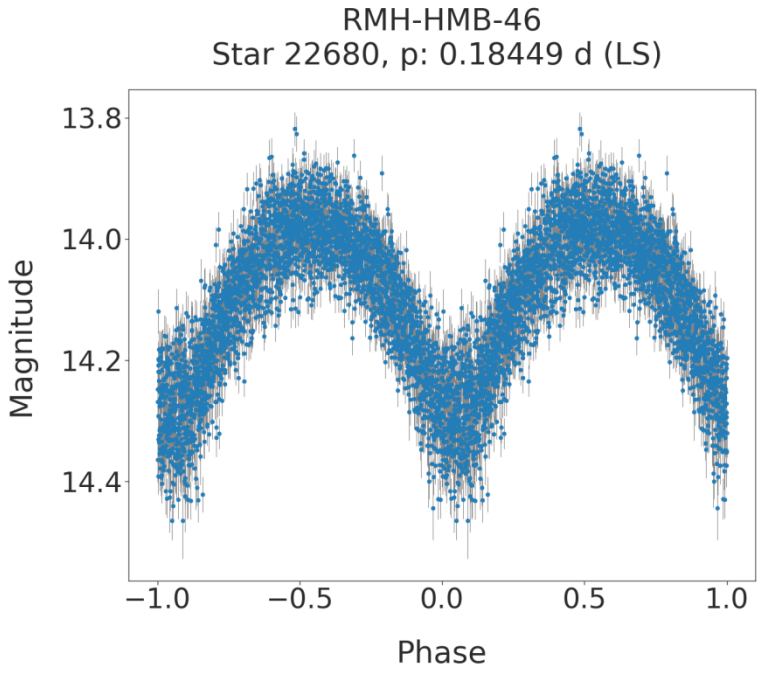

Fig. 29: Phase diagram of RMH-HMB-46, type EW, epoch 2456817.47, period 0.18449 d

Acknowledgements:

This publication makes use of the SIMBAD and VizieR databases operated at the Centre de Données Astronomiques (Strasbourg), France and of the International Variable Star Index (VSX) of the AAVSO. This publication uses the VaSt (Variability Search Toolkit) software found at this URL: http://scan.sai.msu.ru/vast/.

References:

Lomb, N.R., (1976Ap&SS…39…447L)

Ochsenbein F., Bauer P., Marcout J., The VizieR Database of Astronomical Catalogues (2000A&AS…143...23O)

Scargle, J.D., (1982ApJ…263…835S)

Sokolovsky, K. V.; Lebedev, A. A., VaST: A variability search toolkit (2018A&C....22...28S)

Vanmunster, T; PERANSO, www.peranso.com

Watson C. L., 2006, The International Variable Star Index (VSX) (2006SASS...25...47W)