Time-series photometry of the M3 (NGC 5272) field — a globular RR Lyrae harvest (Green band)

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1 Introduction

Messier 3 (NGC 5272) in Canes Venatici is one of the great globular clusters of the northern sky — some half a million stars at a distance of about 10.2 kpc, with an age near 11.4 Gyr. It was the first of Charles Messier's own discoveries, in 1764, and it has since become the single most important cluster in the history of variable-star astronomy: with well over two hundred catalogued variables, the overwhelming majority of them RR Lyrae, M3 is the richest RR Lyrae system known and the archetype against which the Oosterhoff classification and the Blazhko amplitude-modulation effect were defined.

RR Lyrae are horizontal-branch pulsators — the classic Population II standard candles — cycling every 0.2–0.9 d with amplitudes approaching a full magnitude. In M3 they shine near V = 15.6, faint but within reach of a small telescope, so even a short session catches many of them sweeping along the steep branches of their light curves. This report presents one 1.9-hour multi-band series of the field, reduced against the varstar database (AAVSO VSX × Gaia DR3), folding every measured periodic variable onto its catalog ephemeris.

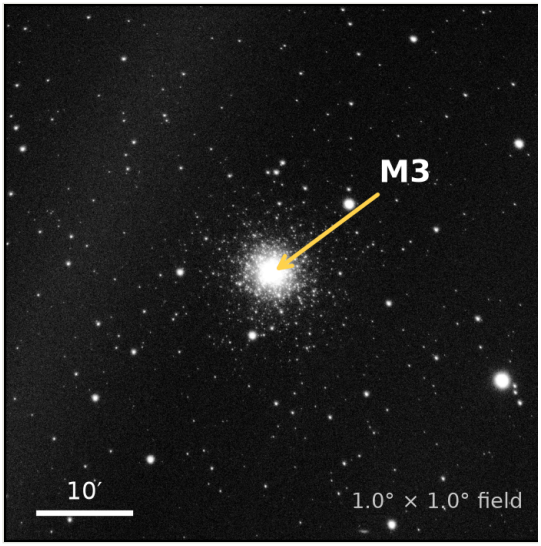

Figure 1. M3 (NGC 5272) near the center of a session luminance frame (author's own data; asinh stretch); a 10′ scale bar is shown. The full sensor field is 2.96° × 2.02° (see Figure 2).

2 Observations & Data Reduction

Equipment. Apertura 60 mm FPL-53 doublet APO refractor (371 mm focal length), ZWO ASI294MM Pro cooled monochrome camera (bin 1, 2.315 µm pixels, 1.28″/px), ZWO Premium 1.25″ LRGB filter set (B, G, R used here). Images acquired at the Lowell Observatory, Flagstaff, AZ (35.20° N, 111.67° W).

Data. 11 × 180 s Green light frames of the M3 field (2.96° × 2.02°, 60 mm Apertura APO + ASI294MM Pro on an AM3 mount) on 2026-04-14/15, 05:32–07:27 UTC (~1.9 h), with 11 × 180 s B, 12 × 180 s R, and one 120 s L frame from the same session; every frame carries its own plate solution (WCS in headers). No dark or flat calibration was applied — the differential ensemble against ~490 field stars removes most common-mode systematics, leaving the un-flattened field as the dominant residual. The B, G, and R series feed the multi-filter phase-fold figure.

Reduction. Source detection (DAOStarFinder) and aperture photometry with sigma-clipped annulus sky subtraction (photutils[1]); per-frame astrometry refit against Gaia DR3[2] positions from the varstar database; per-frame zero points from an ensemble of bright unsaturated field stars present in ≥50% of frames, excluding catalogued variables, with iterative high-scatter rejection. Magnitudes are instrumental G anchored to a Gaia-G zero point (not transformed to a standard system). Variables were identified by cross-match against the AAVSO VSX catalog[3] (10.3 M objects, accessed via VizieR[4] and enriched with Gaia DR3); coordinate, WCS and time handling use Astropy[5]. Nearby high-proper-motion targets whose J2000 catalog position has drifted required a widened labeling tolerance to recover.

3 Results

- **93 RR Lyrae folded onto decades-old catalog ephemerides.** Of 112 periodic variables folded onto their VSX periods and epochs, **93 are RR Lyrae** (74 RRab, 15 RRc) — the signature population of M3, the richest RR Lyrae system known. The RRab star V0464 CVn was caught descending 0.66 mag along its falling branch (P = 0.481 d); the Blazhko-modulated RRab V0377 CVn (RRAB/BL, P = 0.513 d) lands on its steep rise on an ephemeris 7,258 cycles old; and the RRc V0448 CVn validates a period aged 41,281 cycles (median fold age 15,600, oldest 48,900) — implying the catalog periods are accurate to a few parts per million. Blue pulsation amplitudes exceed red throughout, the classic chromatic signature of RR Lyrae.
- **156 catalogued VSX variables measured** in 11 G frames; **19 unsaturated stars show statistically significant variation** (robust scatter > 2.5× measurement error).
- **Photometric precision floor ≈ 22 mmag** (ensemble stars); no flat-field calibration was available — the dominant systematic.
- **Database consistency: 58/155 unsaturated stars agree with their Gaia DR3 G magnitude to within ±0.30 mag**; disagreements are flagged Δ in the table and are dominated by stars observed at a different phase of their variation cycle.
- M3's RR Lyrae shine near V ≈ 15.6, so at 180 s in 11 Green frames many individual light curves do not clear the 2.5× significance threshold on their own; the population is recovered by folding, where the high-amplitude arcs are unambiguous. The single 1.9-hour session samples only ~15% of a typical RR Lyrae cycle per star, so most folds are partial-phase, and the crowded cluster core blends the faintest members. No flats were available.

Finder chart (reference G frame)

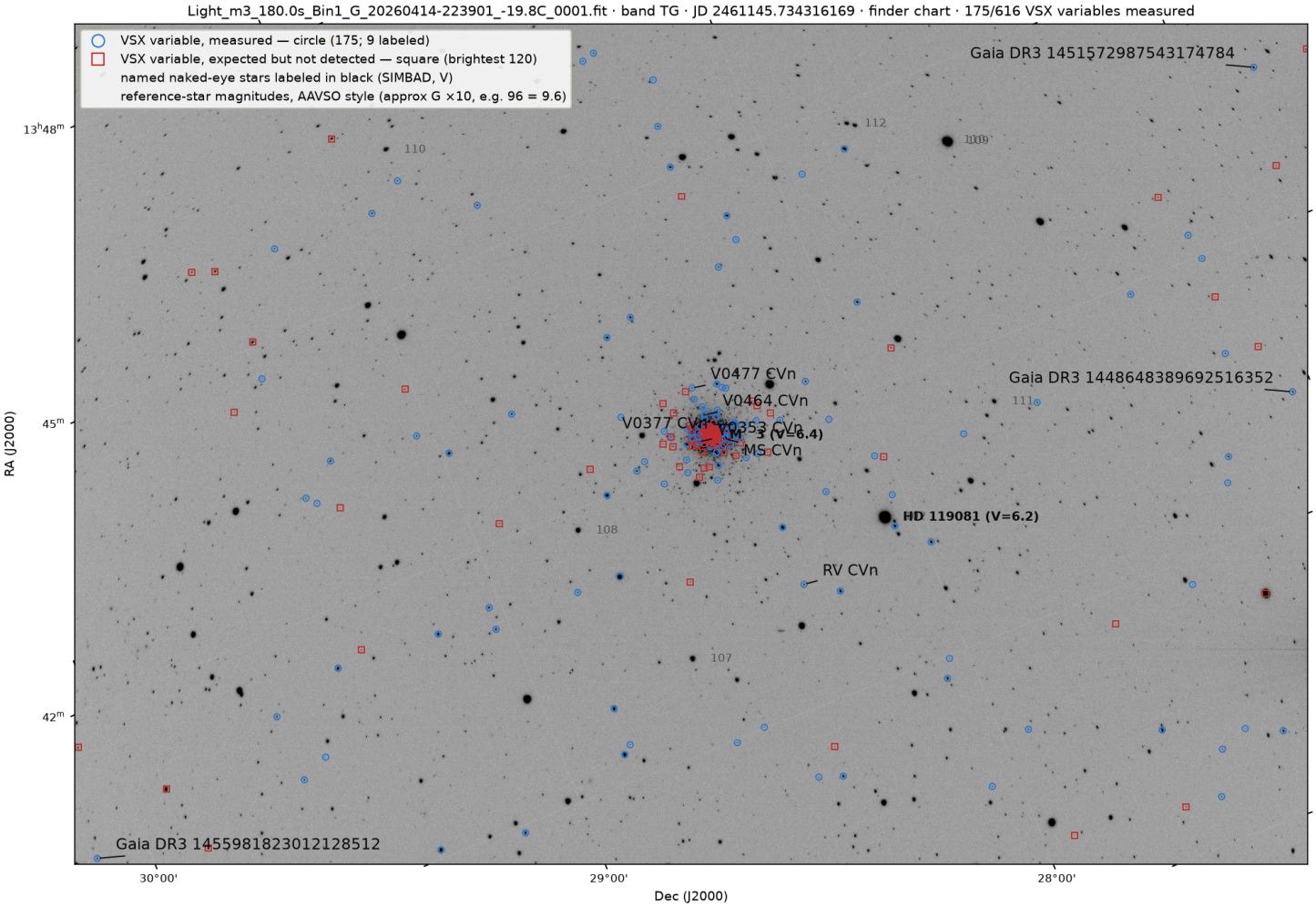

Figure 2. Reference G frame as a finder chart (dark stars on white, RA/Dec J2000 grid). Marker shape distinguishes categories in grayscale: open circles = VSX variables detected and measured (light-curve targets named); open squares = catalogued variables expected but not detected. Bright field stars carry AAVSO-style reference magnitudes (approx. G ×10, decimal dropped; e.g. 96 = 9.6); naked-eye stars named in black for orientation.

Light curves — a cross-section of variability (G)

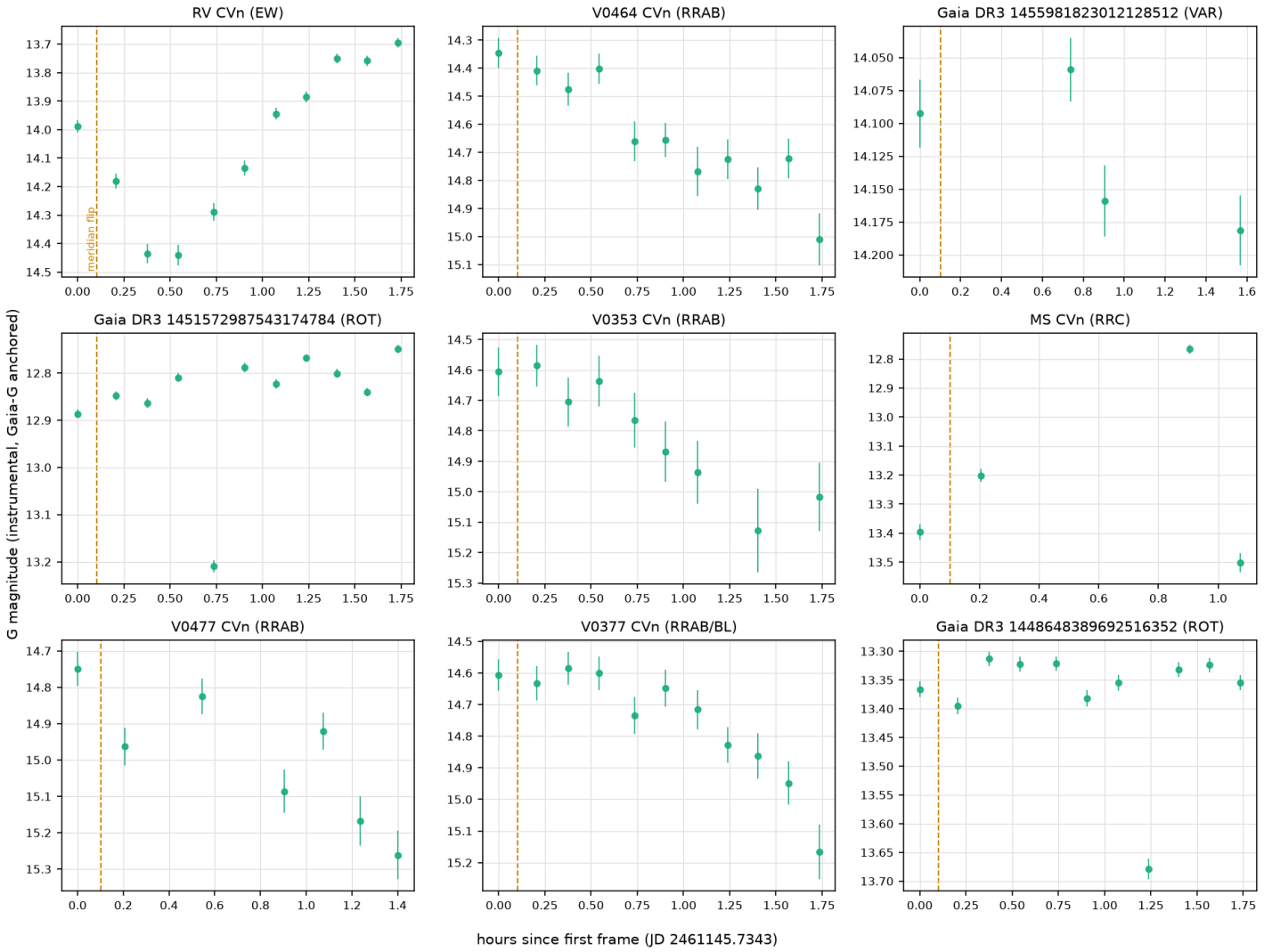

Figure 3. Ensemble differential light curves for the stars labeled on the annotated field: RV CVn, V0464 CVn, Gaia DR3 1455981823012128512, Gaia DR3 1451572987543174784, V0353 CVn, MS CVn, V0477 CVn, V0377 CVn, Gaia DR3 1448648389692516352. The panel is a deliberate cross-section of the classes recovered in the field — RRab and RRc pulsators, the Blazhko-modulated RRab, a contact eclipsing binary, and low-amplitude spotted rotators — shown as raw observed arcs before phase-folding (Figure 6). A meridian flip mid-run (dashed line, where present) can introduce a small per-star magnitude step: the field rotates 180° onto different detector regions whose response is uncorrected without flats, so the per-frame ensemble removes the global shift but a position-dependent residual remains — the dominant systematic in this dataset.

Photometric precision (G)

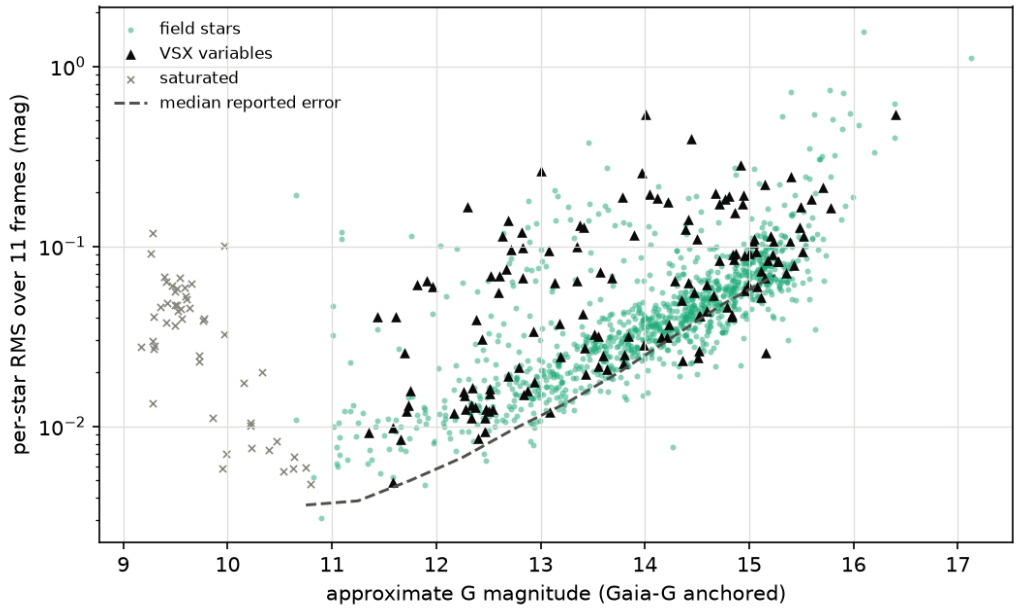

Figure 4. Repeat-measurement RMS vs magnitude for every measured star. The gap between the field-star cloud and the dashed reported-error line at the bright end is the flat-field systematics floor; triangles above the cloud are genuine variables.

Observing yield — measurements by category

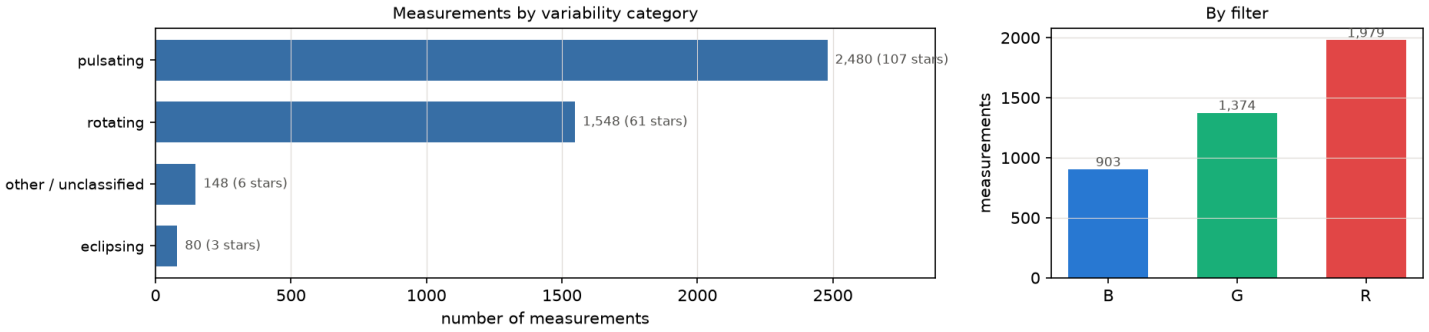

Figure 5. 4,256 ensemble-calibrated measurements across 177 variables. Left: measurements per variability class[6] (with the number of distinct stars); right: measurements per filter. The raw scientific yield of the run.

Phase-folded light curves (all filters)

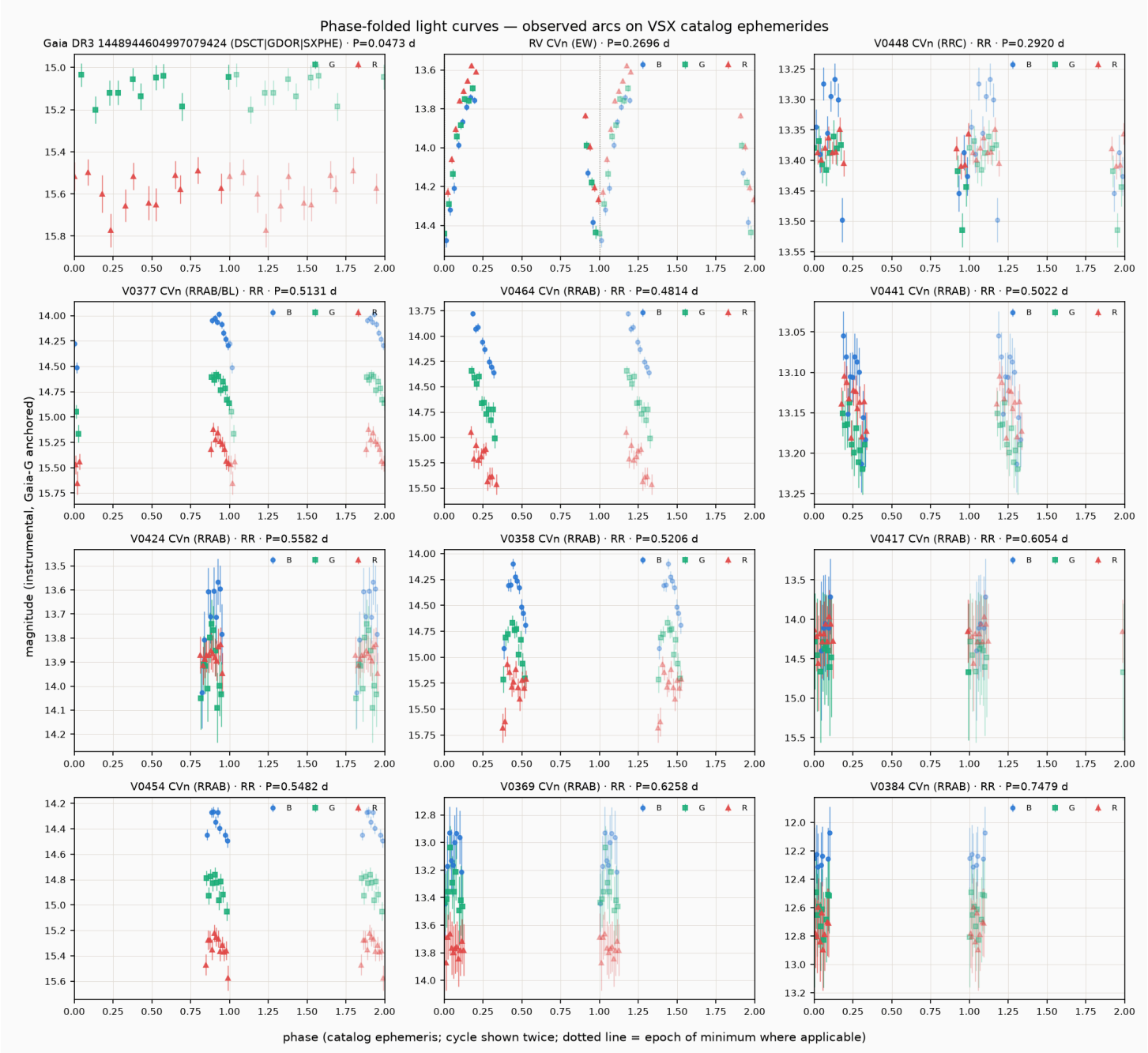

Figure 6. Observed arcs folded onto VSX catalog ephemerides (phase = ((JD − epoch)/P) mod 1; cycle shown twice). The RR Lyrae are caught on the steep rising and falling branches of their cycles — a 1.9-hour window samples ~15% of a typical 0.5-day period — while the short-period δ Scuti/SX Phe pulsator (top-left, P = 68 min) closes a full cycle and an eclipsing binary (RV CVn) drops through minimum. Blue amplitudes exceed red, the chromatic hallmark of RR Lyrae pulsation. Full statistics in fold_summary.csv.

4 Discussion

Caveats. M3's RR Lyrae shine near V ≈ 15.6, so at 180 s in 11 Green frames many individual light curves do not clear the 2.5× significance threshold on their own; the population is recovered by folding, where the high-amplitude arcs are unambiguous. The single 1.9-hour session samples only ~15% of a typical RR Lyrae cycle per star, so most folds are partial-phase, and the crowded cluster core blends the faintest members. No flats were available.

References

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10. Oosterhoff, P. Th. 1939, "Some remarks on the variable stars in globular clusters," Observatory, 62, 104 (the Oosterhoff dichotomy).

Acknowledgements. This work made use of the International Variable Star Index (VSX), operated at AAVSO, Cambridge, MA, USA, and of data from ESA's Gaia mission[7], processed by the Gaia DPAC. Observations were acquired at the Lowell Observatory, Flagstaff, AZ. Photometry was produced with the author's varstar pipeline (vphot / solve_wcs / lightcurve / fold_analysis), developed with Claude (Anthropic).

Appendix A — Per-star measurements

Column definitions

COLUMN	TYPE	UNIT	DEFINITION
name	text	—	Primary VSX identifier (object.name in the varstar database, VSX release 2026-06-28).
vartype	text	—	Variability type as catalogued in VSX (GCVS-style; trailing colon = uncertain classification).
n	integer	frames	Number of G frames in which the star was detected within 2.5″ of its catalog position with a valid flux measurement.
measured G	real	mag	Median of the ensemble-corrected instrumental G magnitudes over the series, zero point anchored to Gaia G (not transformed to a standard system).
Gaia G	real	mag	Gaia DR3 broadband G magnitude of the cross-matched source (catalog reference brightness).
Δ	real	mag	measured G − Gaia G. Nonzero values reflect the filter-bandpass difference, calibration systematics, and genuine variability phase.
db	flag	—	Database-consistency verdict: ✓ when |Δ| ≤ 0.30 mag; Δ-flag when discrepant and worth review.
median_err	real	mag	Median propagated single-measurement uncertainty: 1.0857 · σ_F / F (source photon noise + sky-annulus noise + aperture terms, gain-scaled).
robust_std	real	mag	Robust standard deviation across frames: 1.4826 × median absolute deviation about the series median; the primary variability statistic.
range	real	mag	Peak-to-peak spread (max − min) over the series; outlier-sensitive by construction.
sig	flag	—	Significant variation: robust_std > 2.5 × median_err and > 0.008 mag during the observation window.
sat	flag	—	Saturated: stellar peak exceeded 90% of detector saturation in ≥1 frame; magnitudes unreliable.

Variability summary — one row per star (G band)

Sorted: valid (unsaturated) rows first, significant variation first, then by robust scatter.

NAME	VARTYPE	N	MEASURED G	GAIA G	Δ	DB	MEDIAN_ERR	ROBUST_STD	RANGE	SIG	SAT
RV CVn	EW	11	13.99	13.86	+0.12	✓	0.0220	0.3407	0.747	✓	
V0464 CVn	RRAB	11	14.66	15.68	-1.02	Δ	0.0708	0.2472	0.664	✓	
V0353 CVn	RRAB	9	14.77	15.68	-0.92	Δ	0.0898	0.2365	0.542	✓	
MS CVn	RRC	4	13.30	15.53	-2.23	Δ	0.0253	0.2227	0.736	✓	
V0477 CVn	RRAB	7	14.96	15.82	-0.85	Δ	0.0522	0.2053	0.513	✓	
V0377 CVn	RRAB/BL	11	14.72	15.63	-0.91	Δ	0.0585	0.1657	0.581	✓	
Gaia DR3 1455981823012128512	VAR	4	14.13	14.31	-0.18	✓	0.0263	0.0658	0.122	✓	
Gaia DR3 1451572987543174784	ROT	11	12.82	13.05	-0.22	✓	0.0098	0.0515	0.461	✓	
Gaia DR3 1448648389692516352	ROT	11	13.35	13.37	-0.02	✓	0.0133	0.0456	0.365	✓	
Gaia DR3 1455111525198940032	ROT	11	13.51	13.63	-0.11	✓	0.0153	0.0387	0.110	✓	
Gaia DR3 1455079158325421824	ROT	11	12.87	12.83	+0.04	✓	0.0097	0.0295	0.046	✓	
Gaia DR3 1455117916110279424	ROT	11	12.51	12.40	+0.12	✓	0.0074	0.0254	0.048	✓	
Gaia DR3 1455179763639291392	S	11	11.77	12.08	-0.31	Δ	0.0052	0.0215	0.048	✓	
Gaia DR3 1454946461015878272	ROT	10	12.69	12.74	-0.05	✓	0.0082	0.0214	0.056	✓	
Gaia DR3 1455012633576673536	ROT	11	12.19	12.21	-0.02	✓	0.0058	0.0192	0.033	✓	
Gaia DR3 1454750090815089536	ROT	11	12.28	12.42	-0.15	✓	0.0063	0.0187	0.042	✓	
Gaia DR3 1448709068990379264	ROT	10	12.37	12.63	-0.26	✓	0.0067	0.0175	0.042	✓	
Gaia DR3 1448740198913697280	ROT	11	11.72	11.76	-0.04	✓	0.0048	0.0142	0.035	✓	
Gaia DR3 1454898116865746688	ROT	11	11.59	11.71	-0.11	✓	0.0040	0.0130	0.034	✓	
V0367 CVn	RRAB	4	16.48	15.61	+0.87	Δ	1.5058	0.7274	2.270		
MM CVn	RRAB	10	16.41	15.45	+0.95	Δ	1.4939	0.4213	1.821		
V0366 CVn	RRC	7	14.93	15.61	-0.68	Δ	0.8776	0.2804	0.812		

NAME	VARTYPE	N	MEASURED G	GAIA G	Δ	DB	MEDIAN_ERR	ROBUST_STD	RANGE	SIG	SAT
V0382 CVn	RRAB	11	14.05	15.56	-1.51	Δ	0.2810	0.2751	0.670		
V0429 CVn	RRAB	8	15.41	15.65	-0.24	✓	0.4959	0.2346	0.780		
MU CVn	RRAB/BL	8	14.22	15.70	-1.48	Δ	0.1092	0.2325	0.538		
V0419 CVn	RRAB	7	14.94	15.58	-0.64	Δ	0.1488	0.2310	0.463		
V0446 CVn	RRD	8	15.14	15.45	-0.30	Δ	0.1442	0.2201	0.579		
V0343 CVn	RRAB	7	13.99	15.48	-1.49	Δ	0.4545	0.2187	1.808		
OS CVn	RRAB	8	15.59	15.82	-0.22	✓	0.0962	0.2063	0.625		
Gaia DR3 1454784351776003584	E	10	14.13	16.74	-2.61	Δ	0.6545	0.1998	0.617		
V0358 CVn	RRAB	10	14.82	15.67	-0.84	Δ	0.0864	0.1818	0.545		
V0451 CVn	RRAB	5	15.50	15.45	+0.04	✓	0.1348	0.1810	0.475		
V0368 CVn	RRAB	7	12.32	15.68	-3.35	Δ	0.1229	0.1757	0.518		
V0417 CVn	RRAB	10	14.42	15.57	-1.15	Δ	0.7073	0.1755	0.389		
V0424 CVn	RRAB	11	13.92	15.58	-1.67	Δ	0.1174	0.1735	0.349		
MX CVn	RRAB	8	13.79	15.60	-1.81	Δ	0.1233	0.1733	0.638		
Gaia DR3 1454695944167862400	ROT	9	15.50	14.70	+0.80	Δ	0.0853	0.1695	0.424		
V0384 CVn	RRAB	10	12.63	15.26	-2.63	Δ	0.2893	0.1592	0.335		
V0375 CVn	RRAB	8	12.83	15.52	-2.69	Δ	0.2114	0.1494	0.253		
OZ CVn	RRC	8	13.00	15.57	-2.57	Δ	0.4021	0.1472	0.913		
V0338 CVn	RRC	7	15.70	15.60	+0.11	✓	0.2466	0.1434	0.577		
NP CVn	RRAB	6	15.79	15.46	+0.34	Δ	0.1688	0.1431	0.474		
V0467 CVn	RRAB	4	15.55	15.62	-0.07	✓	0.1110	0.1423	0.347		
V0423 CVn	RRAB	10	14.38	15.61	-1.23	Δ	0.1088	0.1407	0.407		
V0335 CVn	RRC	4	15.93	15.51	+0.42	Δ	0.3281	0.1393	0.478		
IK CVn	RRC	8	15.22	15.63	-0.41	Δ	0.0664	0.1303	0.254		
QV CVn	RRAB	9	13.10	15.61	-2.51	Δ	0.2313	0.1231	0.305		
NSV 6359		4	15.45	15.49	-0.04	✓	0.0867	0.1209	0.194		
LQ CVn	RRAB	9	14.99	15.66	-0.67	Δ	0.0575	0.1193	0.285		
V0469 CVn	RRAB	11	14.86	15.64	-0.78	Δ	0.0496	0.1135	0.265		
PS CVn	RRD	7	15.05	15.63	-0.58	Δ	0.1130	0.1115	0.335		
Gaia DR3 1451831475854886784	ROT	5	15.49	15.41	+0.08	✓	0.0921	0.1105	0.268		
V0421 CVn	RRC	5	15.19	15.63	-0.43	Δ	0.1274	0.1045	0.222		
V0408 CVn	RRAB	11	13.67	15.67	-2.00	Δ	0.1863	0.1018	0.183		
V0369 CVn	RRAB	10	13.38	15.49	-2.11	Δ	0.2089	0.0996	0.459		
OP CVn	RRAB	10	12.69	15.51	-2.82	Δ	0.2636	0.0951	0.477		
V0447 CVn	RRAB	8	15.04	15.62	-0.59	Δ	0.0660	0.0939	0.342		
V0336 CVn	RRAB	8	11.90	15.45	-3.54	Δ	0.1268	0.0937	0.167		
Gaia DR3 1455318783140616704	ROT	4	15.34	14.91	+0.43	Δ	0.0739	0.0930	0.145		
NZ CVn	RRAB	6	12.62	15.56	-2.94	Δ	0.1121	0.0911	0.201		
Gaia DR3 1454749167402492032	ROT	6	15.53	14.98	+0.55	Δ	0.0913	0.0910	0.321		
V0458 CVn	RRAB	9	14.87	15.72	-0.86	Δ	0.0885	0.0910	0.617		
Gaia DR3 1448711371092851072	ROT	6	15.42	15.11	+0.30	Δ	0.0827	0.0904	0.220		
V0407 CVn	RRAB	8	13.41	13.98	-0.57	Δ	0.4541	0.0903	0.455		
V0434 CVn	RRC	8	14.51	15.46	-0.95	Δ	0.1506	0.0892	0.364		
V0471 CVn	RRAB	6	15.40	15.67	-0.27	✓	0.0899	0.0888	0.339		

NAME	VARTYPE	N	MEASURED G	GAIA G	Δ	DB	MEDIAN_ERR	ROBUST_STD	RANGE	SIG	SAT
V0376 CVn	RRAB	6	15.09	15.64	-0.55	Δ	0.0598	0.0887	0.299		
V0454 CVn	RRAB	10	14.83	15.61	-0.79	Δ	0.0635	0.0867	0.289		
Gaia DR3 1454810052856585216	ROT	10	14.98	14.56	+0.42	Δ	0.0535	0.0851	0.339		
V0390 CVn	RRAB	9	12.69	15.61	-2.92	Δ	0.2527	0.0828	0.260		
KV CVn	RRC	7	15.22	15.63	-0.41	Δ	0.0785	0.0824	0.312		
QS CVn	RRAB	8	12.82	15.62	-2.80	Δ	0.2978	0.0795	0.198		
V0426 CVn	RRAB	11	13.11	15.65	-2.54	Δ	0.1393	0.0749	0.209		
V0453 CVn	RRAB	6	14.88	15.64	-0.76	Δ	0.0634	0.0742	0.298		
Gaia DR3 1448939760273966976	ROT	11	14.37	14.54	-0.17	✓	0.0313	0.0725	0.154		
Gaia DR3 1455012049461121408	ROT	5	15.23	14.84	+0.39	Δ	0.0710	0.0712	0.237		
V0404 CVn	RRAB	5	15.34	15.62	-0.28	✓	0.0847	0.0688	0.215		
Gaia DR3 1454891863393353728	ROT	7	15.01	14.70	+0.31	Δ	0.0557	0.0674	0.191		
QR CVn	RRAB	10	12.59	15.60	-3.01	Δ	0.1469	0.0674	0.173		
V0400 CVn	RRAB	8	14.44	15.63	-1.19	Δ	0.7834	0.0671	1.452		
Gaia DR3 1448944604997079424	DSCT|GDOR|SXPHE	10	15.09	15.44	-0.35	Δ	0.0590	0.0664	0.165		
V0418 CVn	RRAB	11	13.55	15.63	-2.08	Δ	0.1982	0.0661	0.221		
V0462 CVn	RRC	4	15.55	15.60	-0.05	✓	0.1061	0.0659	0.157		
V0351 CVn	RRC	7	11.95	15.24	-3.30	Δ	0.0896	0.0656	0.182		
Gaia DR3 1454811427246121984	ROT	11	14.42	14.12	+0.30	Δ	0.0329	0.0639	0.199		
AG Boo	RRAB	7	14.70	15.28	-0.58	Δ	0.0417	0.0634	0.281		
Gaia DR3 1448666806512270208	ROT	8	15.16	15.38	-0.22	✓	0.0633	0.0625	0.234		
V0413 CVn	RRC	9	15.11	15.32	-0.20	✓	0.0982	0.0617	0.251		
NV CVn	RRAB	10	12.52	15.72	-3.20	Δ	0.0385	0.0614	0.253		
Gaia DR3 1454775212084180608	ROT	11	14.59	13.86	+0.73	Δ	0.0381	0.0599	0.224		
V0342 CVn	RRAB	5	11.63	15.55	-3.92	Δ	0.1089	0.0586	0.116		
Gaia DR3 1455243500953903104	ROT	10	14.52	14.54	-0.02	✓	0.0358	0.0542	0.122		
LL CVn	RRAB	5	14.95	15.56	-0.61	Δ	0.0541	0.0522	0.156		
MY CVn	RRAB	10	12.39	15.54	-3.15	Δ	0.0577	0.0516	0.111		
V0363 CVn	RRAB	11	12.70	15.57	-2.87	Δ	0.2598	0.0507	0.373		
Gaia DR3 1451834293353436928	ROT	10	14.60	14.81	-0.21	✓	0.0382	0.0498	0.110		
Gaia DR3 1445653148219694080	RS	9	14.45	14.65	-0.20	✓	0.0341	0.0494	0.198		
Gaia DR3 1455134271345788032	RS	8	14.64	14.39	+0.25	✓	0.0394	0.0474	0.165		
Gaia DR3 1448715562981281408	S	9	14.84	14.85	-0.01	✓	0.0478	0.0474	0.137		
IU CVn	RRAB	4	15.25	15.65	-0.40	Δ	0.0702	0.0449	0.253		
V0412 CVn	RRAB	11	13.35	15.49	-2.13	Δ	0.1403	0.0442	0.218		
Gaia DR3 1455209656611678080	ROT	8	14.29	14.11	+0.18	✓	0.0294	0.0420	0.213		
Gaia DR3 1455198592775947648	ROT	8	14.17	14.07	+0.10	✓	0.0269	0.0418	0.088		
LZ CVn	RRC	11	13.19	15.56	-2.37	Δ	0.0569	0.0381	0.148		
V0432 CVn	RRAB	11	12.92	15.62	-2.69	Δ	0.0578	0.0371	0.118		
Gaia DR3 1454933610475489152	ROT	10	14.24	14.15	+0.09	✓	0.0291	0.0369	0.115		
Gaia DR3 1451800002334522496	ROT	9	15.28	15.31	-0.03	✓	0.0732	0.0351	0.308		
MT CVn	RRAB	6	14.81	15.46	-0.65	Δ	0.0521	0.0347	0.152		
V0348 CVn	RRAB:	11	11.80	15.54	-3.74	Δ	0.0601	0.0339	0.255		
Gaia DR3 1451811478487156352	ROT	11	13.83	14.07	-0.24	✓	0.0199	0.0337	0.100		

NAME	VARTYPE	N	MEASURED G	GAIA G	Δ	DB	MEDIAN_ERR	ROBUST_STD	RANGE	SIG	SAT
V0441 CVn	RRAB	11	13.19	15.69	-2.50	Δ	0.0303	0.0328	0.082		
Gaia DR3 1451661326430462080	ROT	9	14.19	14.32	-0.13	✓	0.0273	0.0328	0.092		
Gaia DR3 1455090084722219264	ROT	10	14.54	14.01	+0.52	Δ	0.0363	0.0319	0.090		
Gaia DR3 1451642943970444928	ROT	9	14.51	14.58	-0.07	✓	0.0366	0.0306	0.143		
V0448 CVn	RRC	11	13.39	15.62	-2.23	Δ	0.0265	0.0299	0.154		
Gaia DR3 1451654420123047296	ROT	6	14.83	15.08	-0.25	✓	0.0490	0.0299	0.124		
Gaia DR3 1454683196704923648	ROT	10	13.98	14.17	-0.19	✓	0.0230	0.0279	0.097		
IT CVn	RRAB	4	15.10	15.45	-0.34	Δ	0.0663	0.0271	0.165		
Gaia DR3 1454729547992358656	ROT	11	13.56	12.88	+0.68	Δ	0.0158	0.0261	0.122		
Gaia DR3 1454903133387748736	ROT	11	13.61	13.69	-0.08	✓	0.0165	0.0251	0.084		
Gaia DR3 1455299988363762688	ROT	6	14.50	14.62	-0.12	✓	0.0357	0.0245	0.063		
Gaia DR3 1454892447508912512	RS	11	13.55	13.51	+0.04	✓	0.0156	0.0230	0.067		
V0397 CVn	LB:	11	12.78	12.64	+0.14	✓	0.0100	0.0227	0.078		
V0472 CVn	RRAB	6	15.29	15.62	-0.33	Δ	0.0772	0.0225	0.232		
ASASSN-V J134106.78+290202.0	SR	11	13.43	12.87	+0.56	Δ	0.0141	0.0222	0.071		
Gaia DR3 1454878252642442624	SR|M	11	12.43	12.08	+0.35	Δ	0.0552	0.0214	0.106		
V0383 CVn	RRAB	11	11.43	15.57	-4.14	Δ	0.0805	0.0214	0.152		
CSS_J133844.2+272627	RRD	4	15.78	16.10	-0.32	Δ	0.1126	0.0200	0.195		
Gaia DR3 1454784386135471232	L	11	11.69	12.03	-0.34	Δ	0.1066	0.0200	0.102		
Gaia DR3 1455129907659014144	E	7	13.63	13.59	+0.04	✓	0.0171	0.0195	0.064		
IO CVn	ACEPS|RR	5	15.10	15.43	-0.33	Δ	0.0655	0.0190	0.139		
NSV 19960		11	14.36	14.85	-0.49	Δ	0.0309	0.0168	0.085		
IW CVn	SRD	11	12.51	12.19	+0.31	Δ	0.0080	0.0159	0.055		
Gaia DR3 1454783870738442752	ROT	11	13.43	13.00	+0.43	Δ	0.0196	0.0149	0.111		
MW CVn	SR:	11	12.35	12.04	+0.30	Δ	0.0095	0.0143	0.058		
Gaia DR3 1454814485262873088	ROT	11	12.33	12.50	-0.17	✓	0.0063	0.0138	0.046		
Gaia DR3 1454975529354515712	ROT	6	15.16	14.52	+0.64	Δ	0.0628	0.0133	0.079		
Gaia DR3 1454931888190865536	ROT	11	12.26	12.22	+0.04	✓	0.0060	0.0132	0.059		
Gaia DR3 1454836234977197056	ROT	11	12.48				0.0067	0.0131	0.027		
Gaia DR3 1454711539189406592	ROT	9	12.50	12.54	-0.04	✓	0.0069	0.0131	0.039		
KQ CVn	SR	11	11.74	11.85	-0.12	✓	0.0054	0.0130	0.039		
Gaia DR3 1454865440754851840	ROT	11	13.79	13.65	+0.14	✓	0.0191	0.0129	0.076		
Gaia DR3 1454972024661200256	ROT	11	12.94	12.95	-0.01	✓	0.0098	0.0119	0.058		
Gaia DR3 1448654814963588480	RS	10	13.09	13.19	-0.10	✓	0.0111	0.0116	0.043		
Gaia DR3 1454834723148707712	ROT	11	12.84	12.95	-0.11	✓	0.0086	0.0110	0.056		
V0372 CVn	SR	11	12.46	12.17	+0.29	✓	0.0083	0.0108	0.038		
Gaia DR3 1455247830280916608	ROT	8	13.81	13.49	+0.32	Δ	0.0195	0.0106	0.077		
Gaia DR3 1455191480310131456	ROT	11	12.48	12.34	+0.14	✓	0.0075	0.0105	0.044		
ASASSN-V J134421.05+280834.6	SR	11	12.26	11.89	+0.37	Δ	0.0060	0.0100	0.054		
Gaia DR3 1454767034466420224	ROT	11	12.33	12.41	-0.08	✓	0.0063	0.0095	0.034		
V0473 CVn	SRD	11	12.54	12.18	+0.36	Δ	0.0069	0.0094	0.035		
Gaia DR3 1455059057878501632	ROT	11	11.66	11.33	+0.33	Δ	0.0045	0.0071	0.032		
Gaia DR3 1454747999171384064	ROT	11	12.39	12.53	-0.14	✓	0.0065	0.0059	0.031		
Gaia DR3 1451702420677578240	DSCT|GDOR|SXPHE	7	11.34	11.69	-0.35	Δ	0.0040	0.0046	0.032		

NAME	VARTYPE	N	MEASURED G	GAIA G	Δ	DB	MEDIAN_ERR	ROBUST_STD	RANGE	SIG	SAT
Gaia DR3 1454788955979531008	ROT	11	11.59	11.63	-0.04	✓	0.0041	0.0025	0.016		
NSV 19922		11	9.99	9.99	+0.00	✓	0.0026	0.0055	0.029		sat