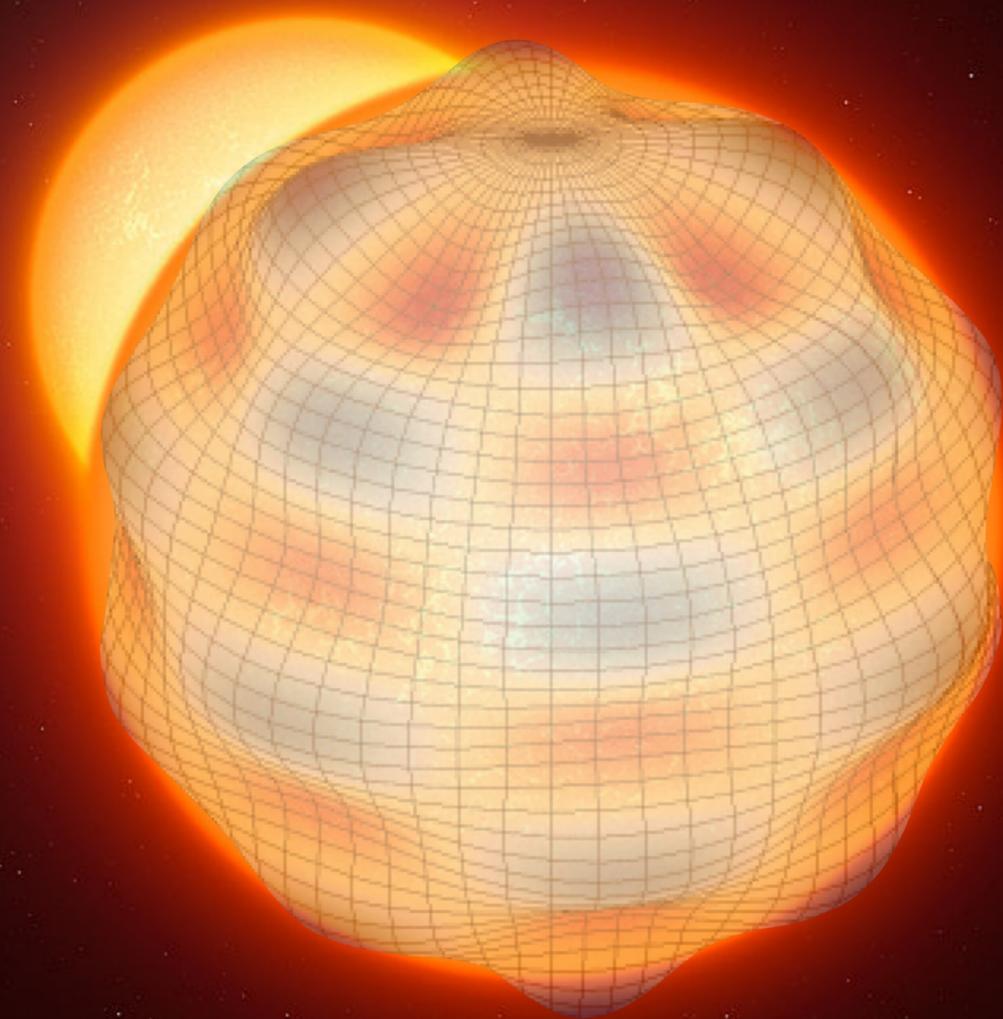


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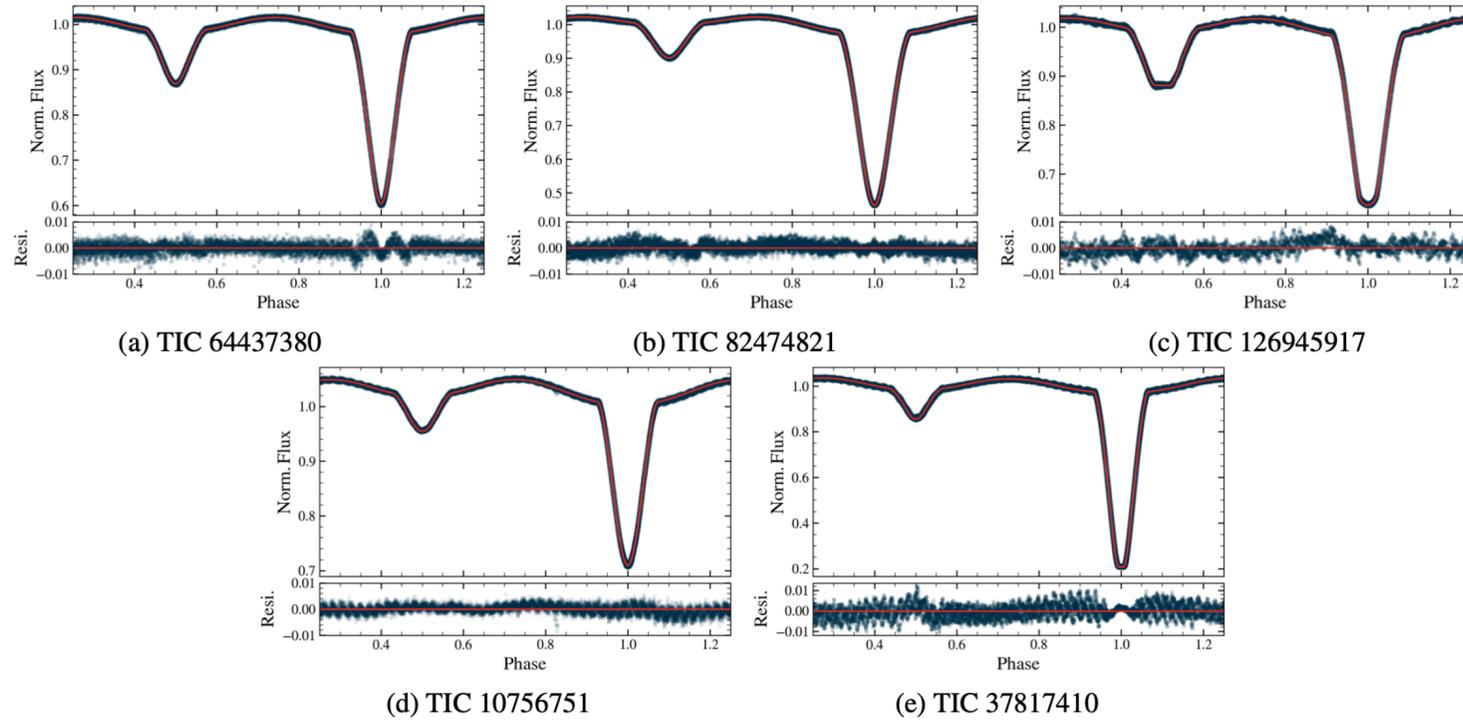
# PULSATONAL CHARACTERISTICS OF MASS ACCRETING STARS IN CLOSE BINARY SYSTEMS

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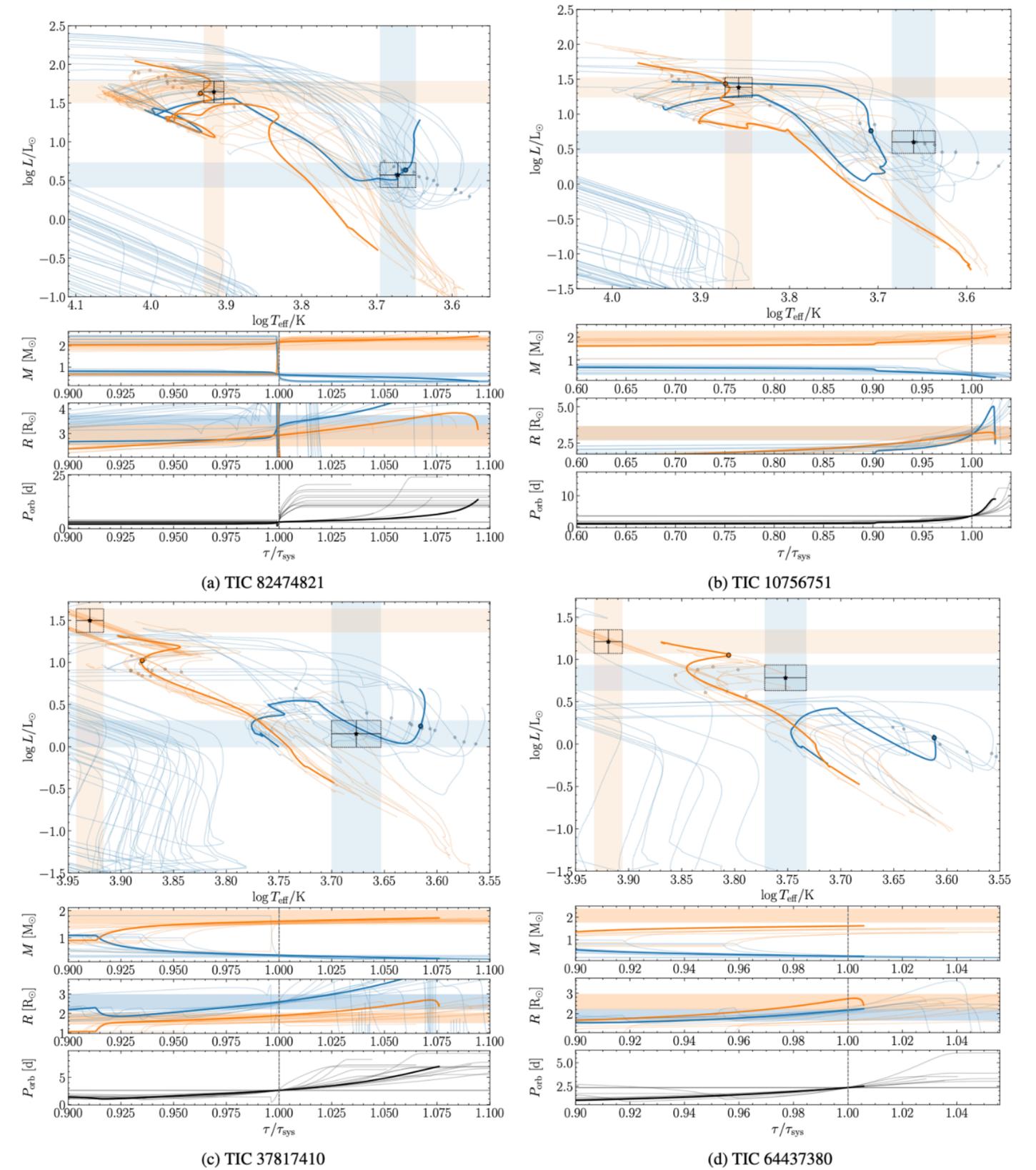


AMADEUSZ MISZUDA  
CAMK ANNUAL MEETING  
2026

# OSCILLATING ECLIPSING ALGOL CANDIDATES

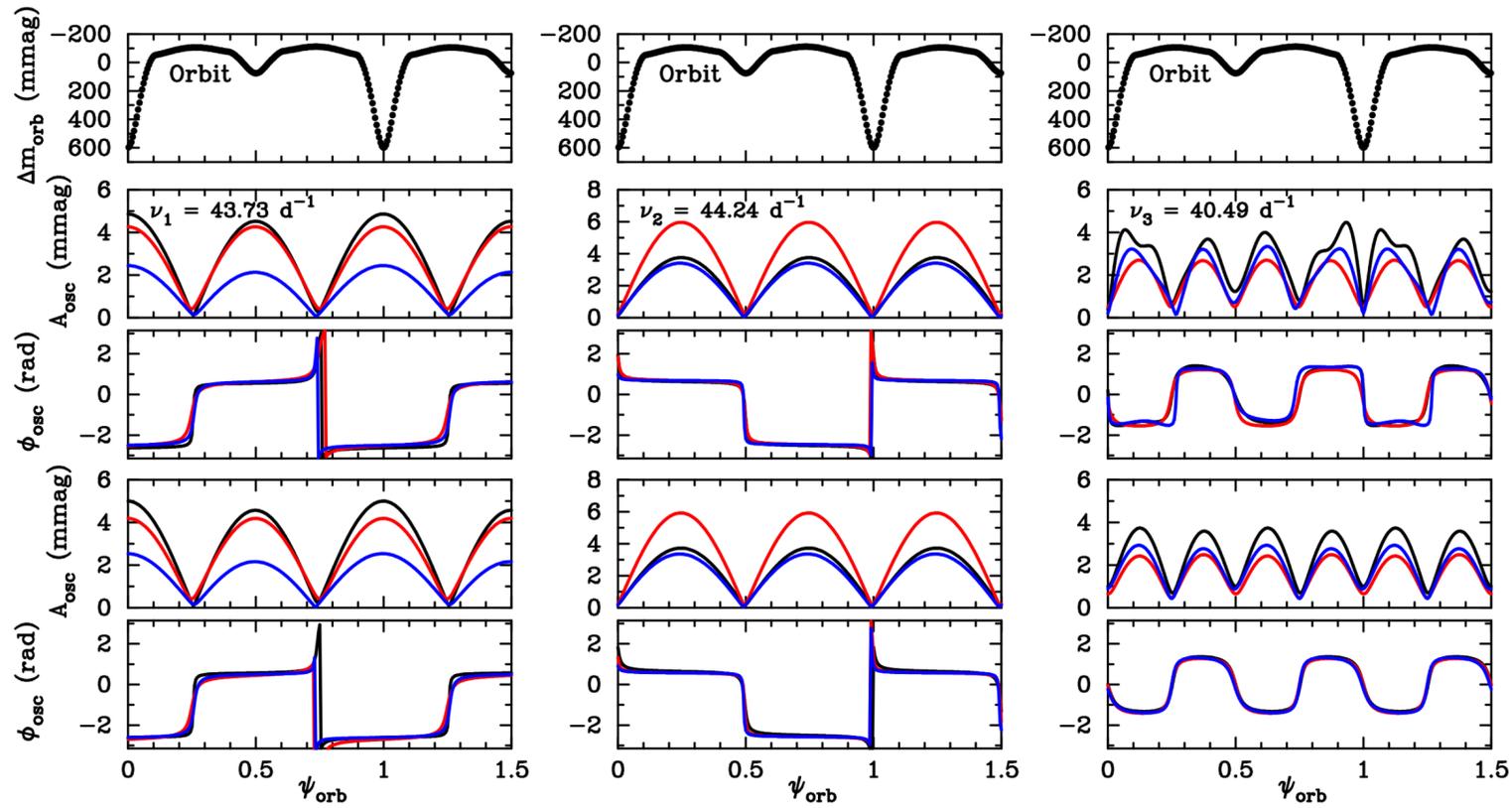


Parameters	TIC 64437380	TIC 82474821	TIC 126945917	TIC 10756751	TIC 37817410
$T_0$ (BJD-2457000)	$2363.57069 \pm 0.0002$	$2232.26734 \pm 0.0005$	$3155.52250 \pm 0.00001$	$3208.97018 \pm 0.00002$	$1439.30929 \pm 0.00045$
$P_{\text{orb}}$ [days]	$2.34694 \pm 0.00019$	$2.74738 \pm 0.00001$	$1.34109 \pm 0.00002$	$3.48827 \pm 0.00019$	$2.60611 \pm 0.00640$
$i$ [°]	$82.95 \pm 0.15$	$79.95 \pm 0.01$	$89.10 \pm 0.19$	$75.40 \pm 0.05$	$87.30 \pm 0.01$
$q$	$0.098 \pm 0.017$	$0.303 \pm 0.014$	$0.102 \pm 0.017$	$0.217 \pm 0.009$	$0.181 \pm 0.008$
$K_1$ [km s <sup>-1</sup> ]	$18.7 \pm 2.5$	$50.9 \pm 0.5$	$23.8 \pm 2.9$	$31.8 \pm 0.4$	$30.3 \pm 1$
$K_2$ [km s <sup>-1</sup> ]	$192.1 \pm 4.2$	$167.8 \pm 2.4$	$233.2 \pm 6.2$	$146.9 \pm 1.8$	$167.1 \pm 1.4$
$\gamma$ [km s <sup>-1</sup> ]	$-11.9 \pm 1.6$	$31.56 \pm 0.4$	$-29.3 \pm 2.4$	$27.3 \pm 0.3$	$-11.5 \pm 0.7$
$v \sin(i)_1$ [km s <sup>-1</sup> ] (BF)	$74 \pm 7$	$57 \pm 1$	$78 \pm 1$	$52 \pm 2$	$45 \pm 2$
$a$ [R <sub>⊙</sub> ]	$9.782 \pm 0.225$	$11.875 \pm 0.133$	$6.815 \pm 0.181$	$12.327 \pm 0.125$	$10.171 \pm 0.085$
$T_{\text{eff},1}$ [K] (ISPEC)	$8450 \pm 210$	$7450 \pm 100$	$7780 \pm 120$	$7300 \pm 130$	$7920 \pm 150$
$T_{\text{eff},2}$ [K] (GSSP)	$5900 \pm 200$	$4400 \pm 200$	$5100 \pm 200$	$4500 \pm 200$	$4800 \pm 200$
$T_{\text{eff},2}/T_{\text{eff},1}$	$0.653 \pm 0.001$	$0.569 \pm 0.001$	$0.709 \pm 0.005$	$0.635 \pm 0.005$	$0.554 \pm 0.001$
$M_1$ [M <sub>⊙</sub> ]	$2.14 \pm 0.14$	$2.39 \pm 0.09$	$2.15 \pm 0.17$	$1.87 \pm 0.06$	$1.76 \pm 0.04$
$M_2$ [M <sub>⊙</sub> ]	$0.208 \pm 0.033$	$0.725 \pm 0.019$	$0.219 \pm 0.033$	$0.406 \pm 0.011$	$0.319 \pm 0.012$
$R_1$ [R <sub>⊙</sub> ]	$2.685 \pm 0.010$	$3.026 \pm 0.005$	$1.989 \pm 0.001$	$3.244 \pm 0.015$	$1.761 \pm 0.001$
$R_2$ [R <sub>⊙</sub> ]	1.95 (fixed)	3.20 (fixed)	1.24 (fixed)	3.19 (fixed)	2.6 (fixed)
$\log(g)_1$	$3.940 \pm 0.002$	$3.822 \pm 0.001$	$4.035 \pm 0.004$	$3.715 \pm 0.001$	$4.202 \pm 0.002$
$\log(g)_2$	$3.143 \pm 0.004$	$3.232 \pm 0.005$	$3.458 \pm 0.002$	$3.027 \pm 0.001$	$3.165 \pm 0.005$



PAWAR T., MISZUDA A., HELMINIAK K. G., MARCADON F., MOHARANA A., PAWAR G., KONACKI M., A&A, 705, A251 (2026)

# EL CMi: CONFIRMATION OF TRIAXIAL PULSATION THEORY

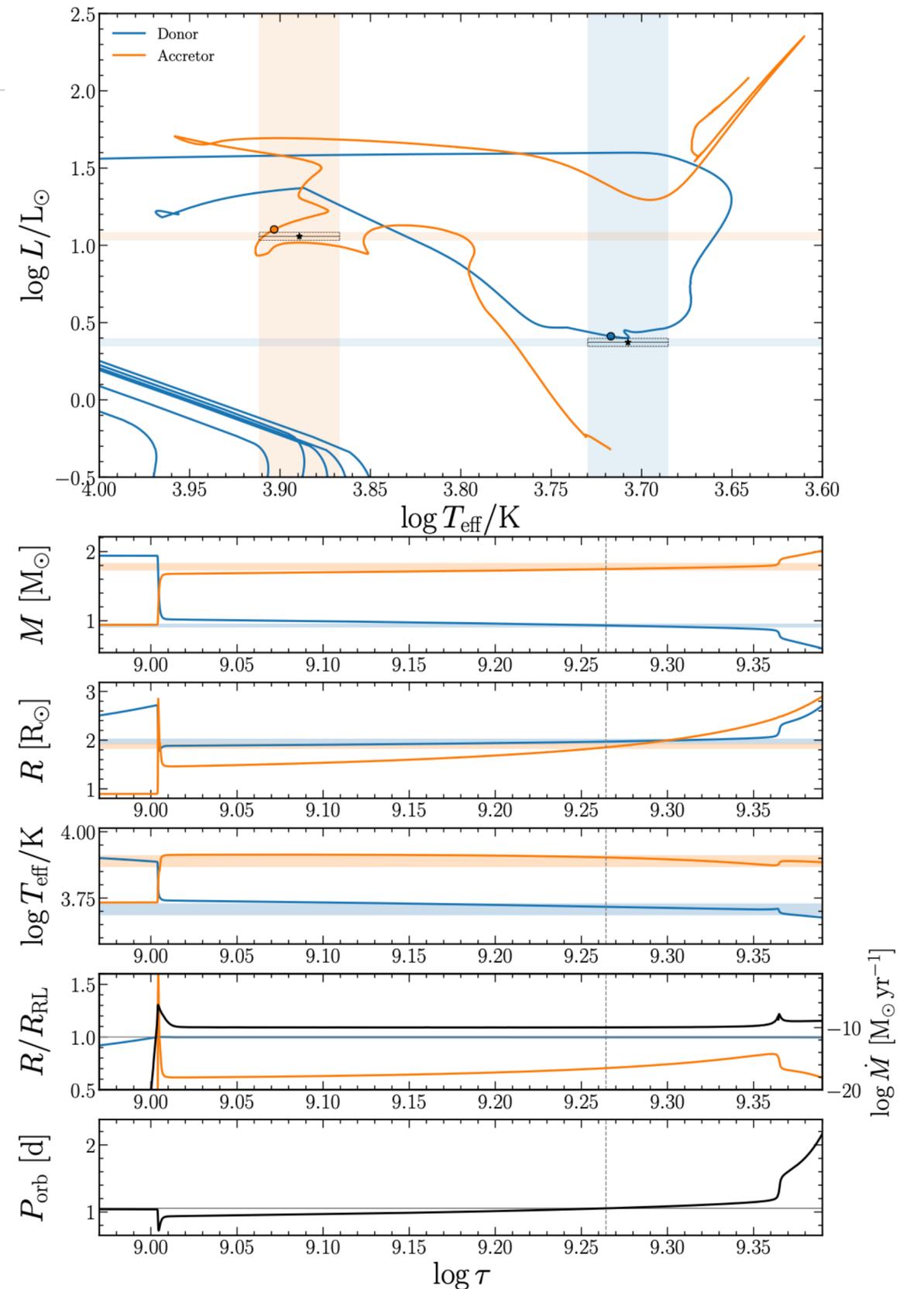


**Fig. 5.** Run of the pulsation amplitude and phase for the three main modes of EL CMi. Black: Sector 34 data. Red: Sector 61 data. Blue: Sector 88 data. Upper panel: Orbital light curve. Second and third panels: All data. Lower two panels: Reconstructions from the data without the primary eclipses. The frequencies are for the multiplet centroids.

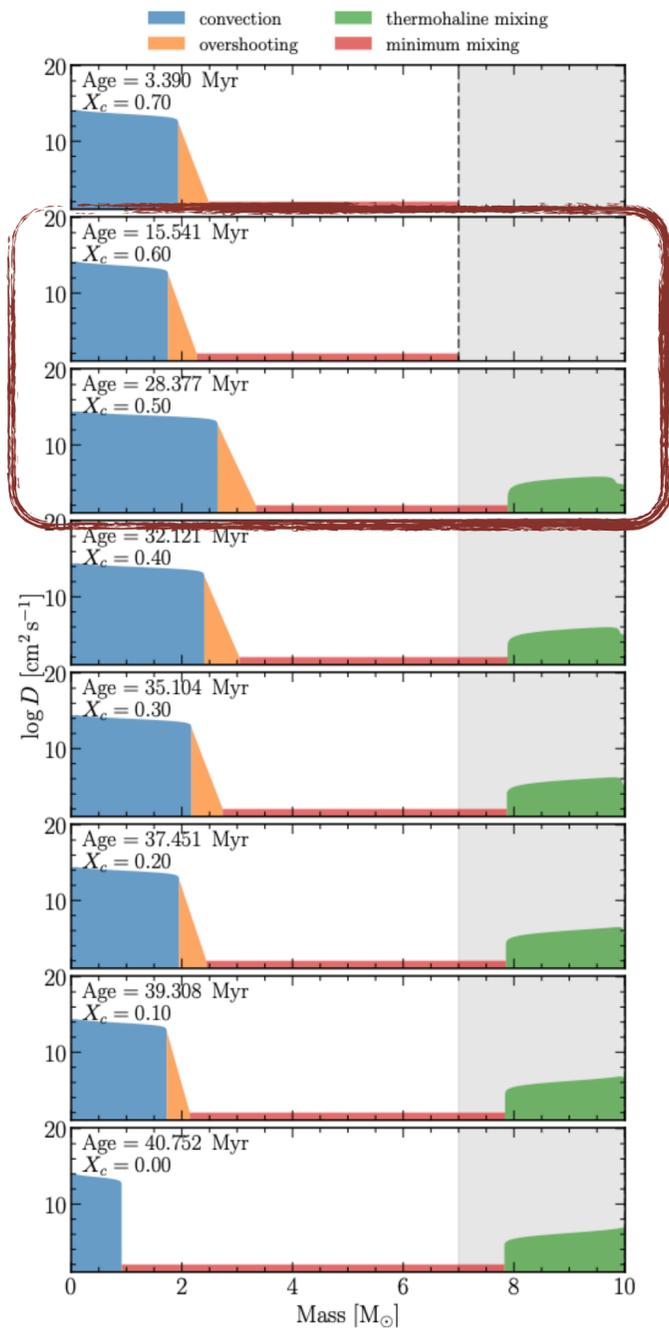
Parameter	PHOEBE	Light curve + SED (1)	Light curve + SED (2)
$M_1$ [ $M_\odot$ ]	$1.78 \pm 0.03$	$1.70 \pm 0.03$	$1.75 \pm 0.03$
$M_2$ [ $M_\odot$ ]	$0.93 \pm 0.01$	$0.96 \pm 0.03$	$0.97 \pm 0.03$
$R_1$ [ $R_\odot$ ]	$1.88 \pm 0.01$	$1.85 \pm 0.11$	$2.14 \pm 0.11$
$R_2$ [ $R_\odot$ ]	$1.97 \pm 0.01$	$2.00 \pm 0.03$	$1.72 \pm 0.12$
$T_{\text{eff},1}$ [K]	7750 (fixed)	$7779 \pm 120$	$7566 \pm 120$
$T_{\text{eff},2}$ [K]	$5040 \pm 10$	$5216 \pm 123$	$5113 \pm 120$
$i^\circ$ [deg]	$78.6 \pm 0.05$	$76.9 \pm 0.7$	$80.6 \pm 2.3$
$L_1$ [ $L_\odot$ ]	$11.5 \pm 0.6$	$11.3 \pm 1.2$	$13.6 \pm 1.2$
$L_2$ [ $L_\odot$ ]	$2.26 \pm 0.05$	$2.7 \pm 0.27$	$1.80 \pm 3.2$
$q$	$0.523 \pm 0.004$	$0.566 \pm 0.019$	$0.554 \pm 0.019$
$\gamma$ [ $\text{km s}^{-1}$ ]	$28.0 \pm 1.4$	n/a	n/a

Parameter	Value
Systems' age $\tau$	$1.7 \pm 0.3$ Gyr
Mass transfer rate $\dot{M}$	$\approx 10^{-10} M_\odot \text{ yr}^{-1}$
Donor's current $X_c$	$< 0.1$
Accretor's current $X_c$	0.45
Systems' age at the beginning of MT	1.01 Gyr
Time since the main phase of MT	0.65 Gyr

HANDLER ET AL., A&A, 702, A104 (2025)



# THE ASTEROSEISMIC IMPRINTS OF MASS TRANSFER



Before MT: receding convection core



After MT: Expanding convection core



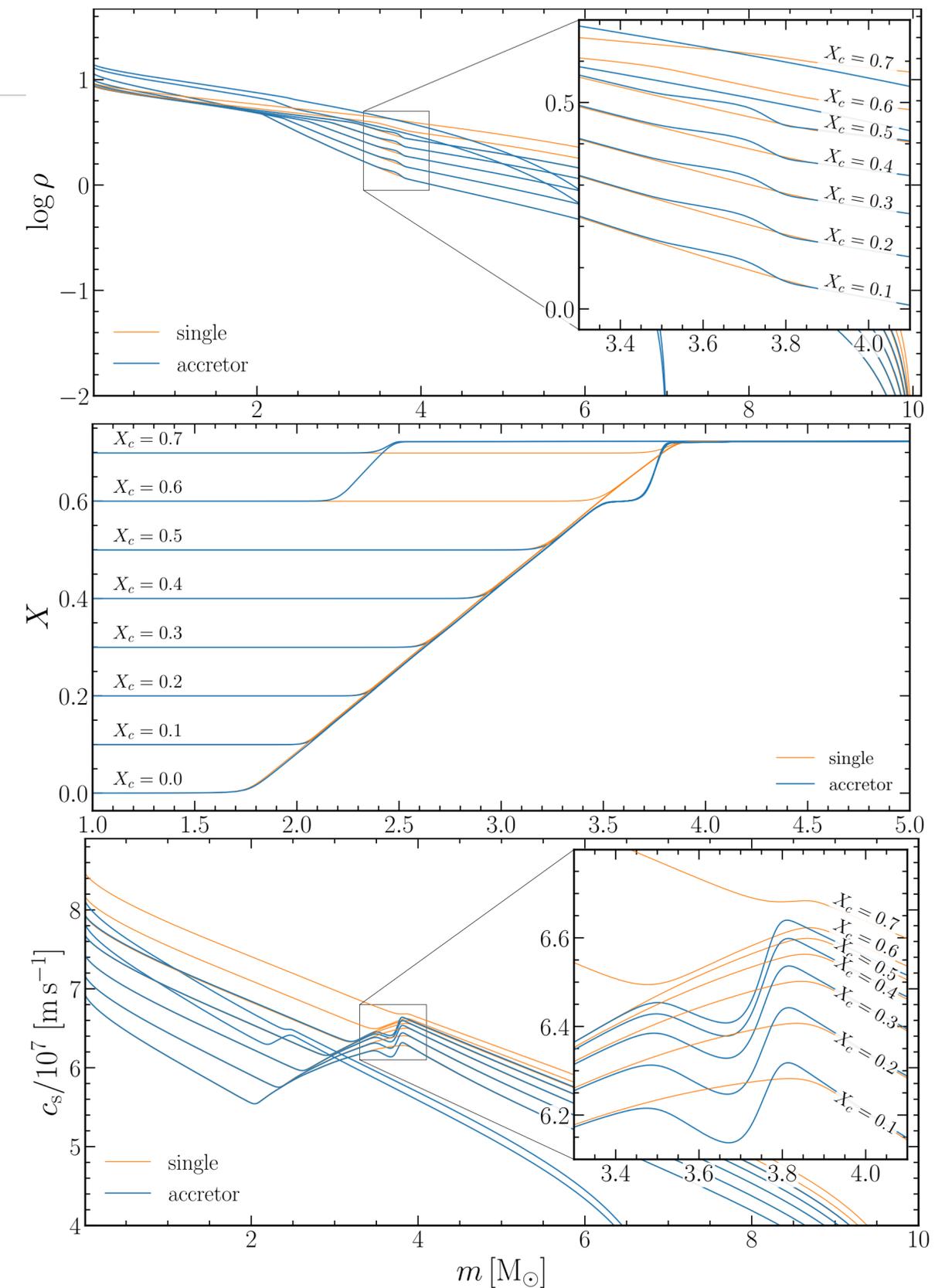
Engulfment of layers left behind the receding convection core



Compression of the surrounding chemically stratified region

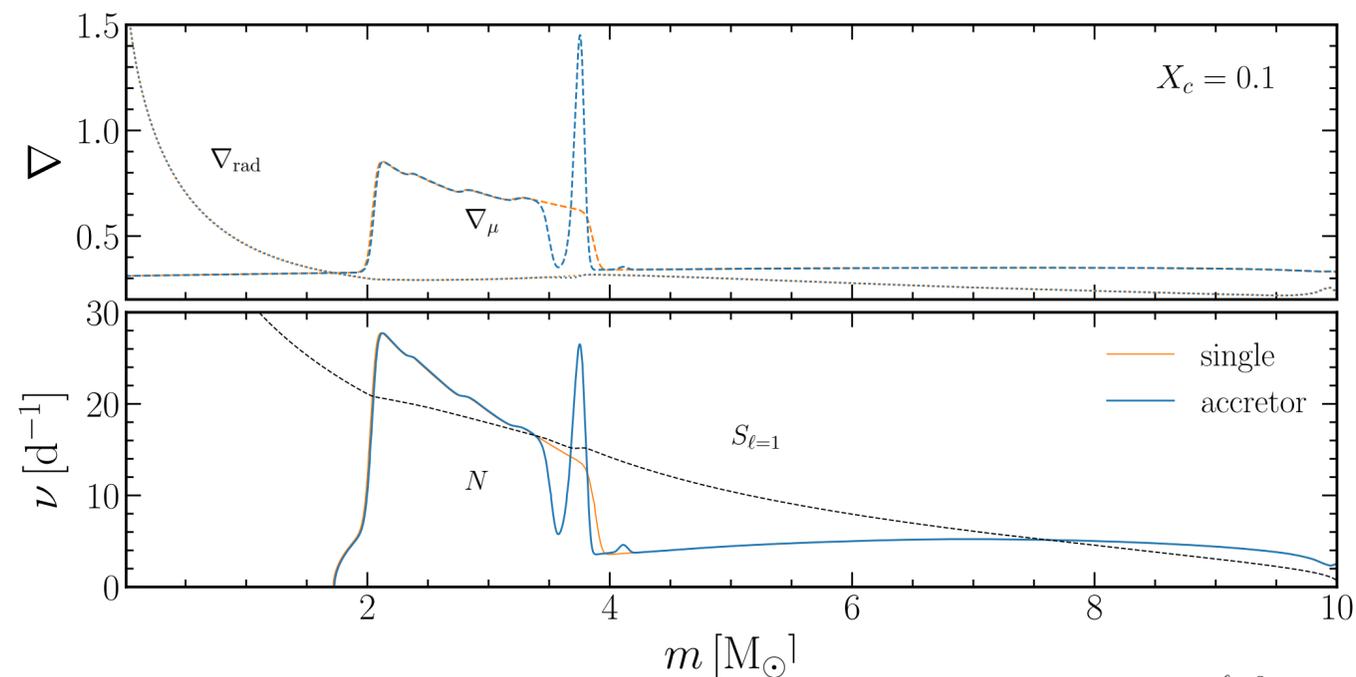


Steepening the hydrogen gradient in the adjacent layers

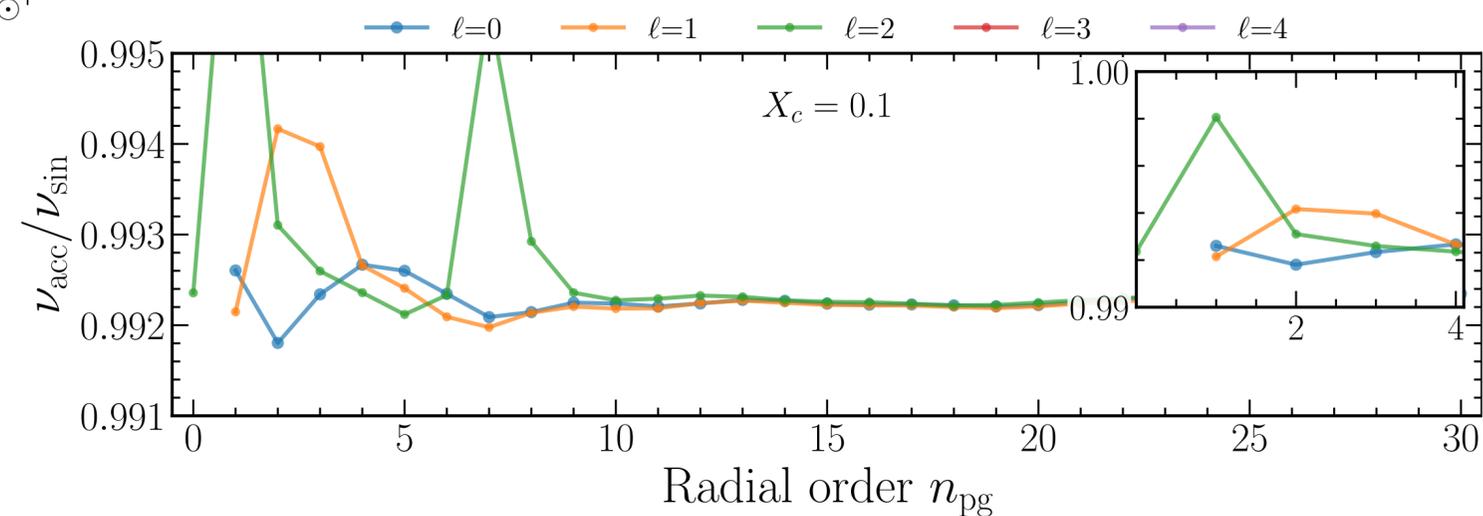
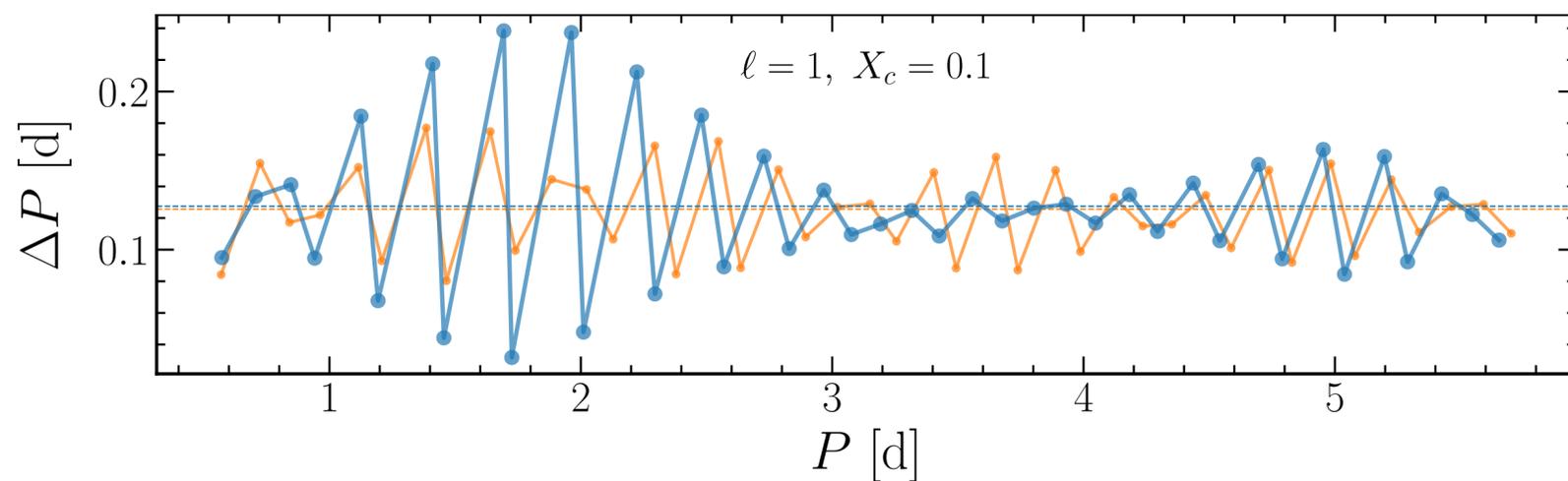


MISZUDA A., GUO Z., TOWNSEND R. H. D., (2025), A&A 702, A203

# THE ASTEROSEISMIC IMPRINTS OF MASS TRANSFER



See also Wagg et al., 2024  
Henneco et al., 2024; 2025



$$\delta(\Delta P_{\ell, \text{asym}}) = 20 - 200 \text{ s for } \ell = 1, 2$$

$$\delta \nu_{\ell, n_{\text{pg}}}^{\text{acc}} / \nu_{\ell, n_{\text{pg}}}^{\text{sin}} \sim 0.5 \%$$

$$0.03 - 0.07 d^{-1} \text{ in the } 5 - 15 d^{-1}$$

MISZUDA A., GUO Z., TOWNSEND R. H. D., (2025), A&A 702, A203

# SUMMARY

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## PAPERS:

- „THE ASTEROSEISMIC AND EVOLUTIONARY IMPRINTS OF MASS TRANSFER, THE 10Ms  $\beta$  CEP CASE STUDY”, **MISZUDA A.**, GUO Z., TOWNSEND R.H.D, A&A 702, A203 (2025)
- „OFF-CENTRE CONVECTIVE ZONES IN MASS ACCRETING STELLAR MODELS”, **MISZUDA A.**, A&A 701, L7 (2025)
- „EL CMI: CONFIRMATION OF TRIAXIAL PULSATION THEORY”, HANDLER ET AL., A&A 702, 104 (2025)
- „A comprehensive study of  $\delta$ Scuti-type pulsators in eclipsing binaries: oscillating eclipsing Algols”, PAWAR T. B., **MISZUDA A.**, ET AL. A&A, 705, A251 (2026)
- „*PULSATIONAL CHARACTERISTICS OF MASS ACCRETING STARS IN CLOSE BINARY SYSTEMS*”, **MISZUDA A.**, *COSKA* 55, 196 (2025)
- „*CHARACTERIZING THE VARIABILITY OF A SAMPLE OF MASSIVE STARS IN ECLIPSING BINARIES*”, EZE, C. I., ET AL., *COSKA* 55, 452 (2025)

## CONFERENCES:

- BINARY STARS IN THE SPACE ERA, KEELE UNIVERSITY, KEELE, UNITED KINGDOM - POSTER
- TASC9/KASC16, ISTA, VIENNA, AUSTRIA - CONTRIBUTED TALK
- STELLAR VARIABILITY: TAKING THE PULSE OF THE UNIVERSE, IUCAA, PUNE, INDIA - CONTRIBUTED TALK
- MESA SUMMER SCHOOL, KU LEUVEN, BELGIUM - TEACHING ASISTANT