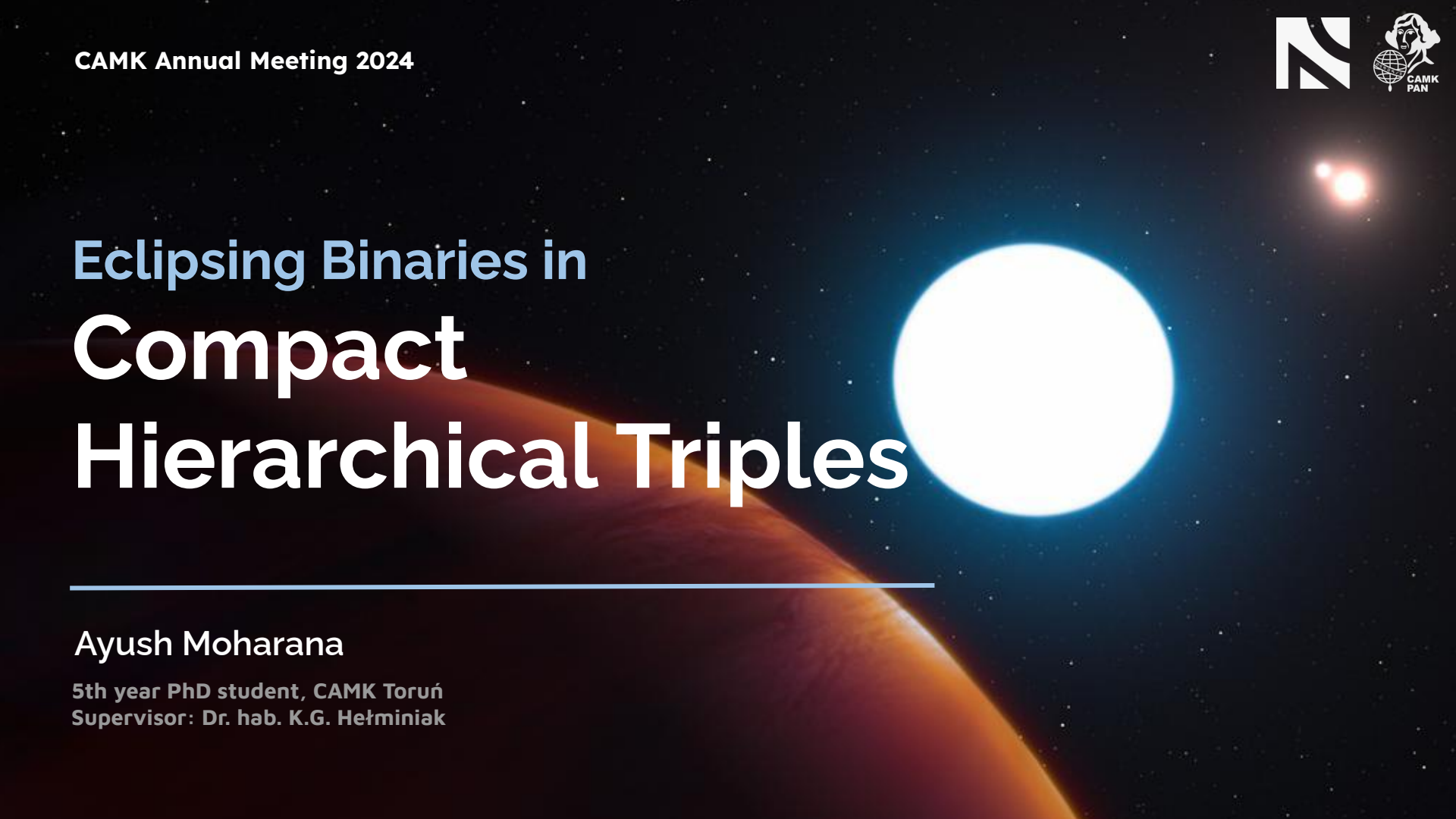
CAMK Annual Meeting 2024

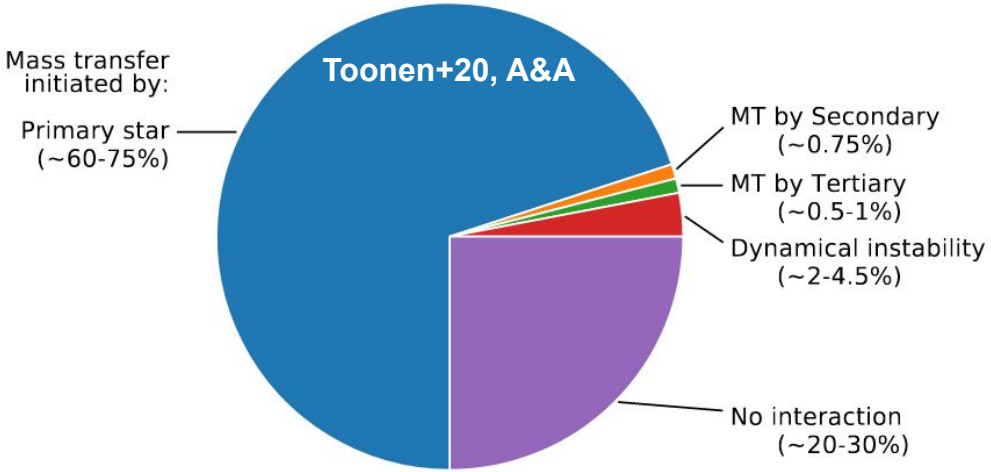


Eclipsing Binaries in Compact Hierarchical Triples

Ayush Moharana

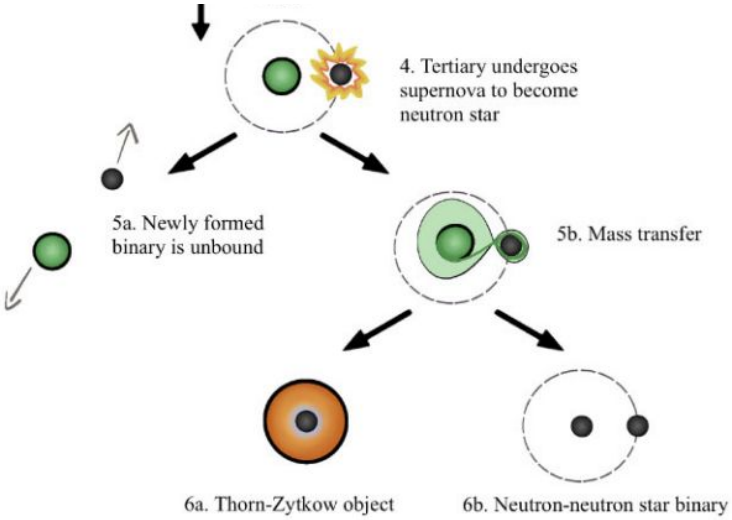
5th year PhD student, CAMK Toruń
Supervisor: Dr. hab. K.G. Hełminiak

Triples: Evolution and Dynamics



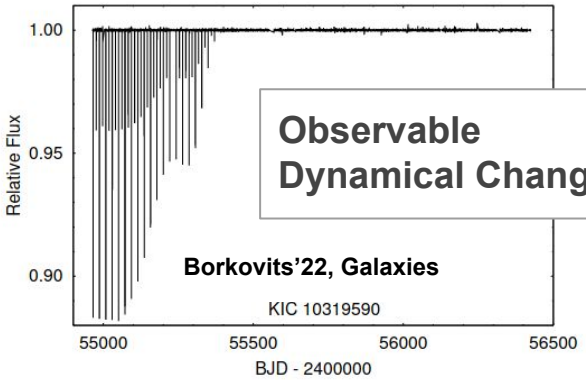
Triples are reactive

(Eisner+22, MNRAS)

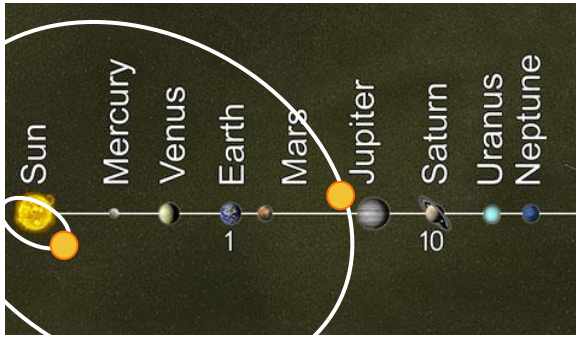


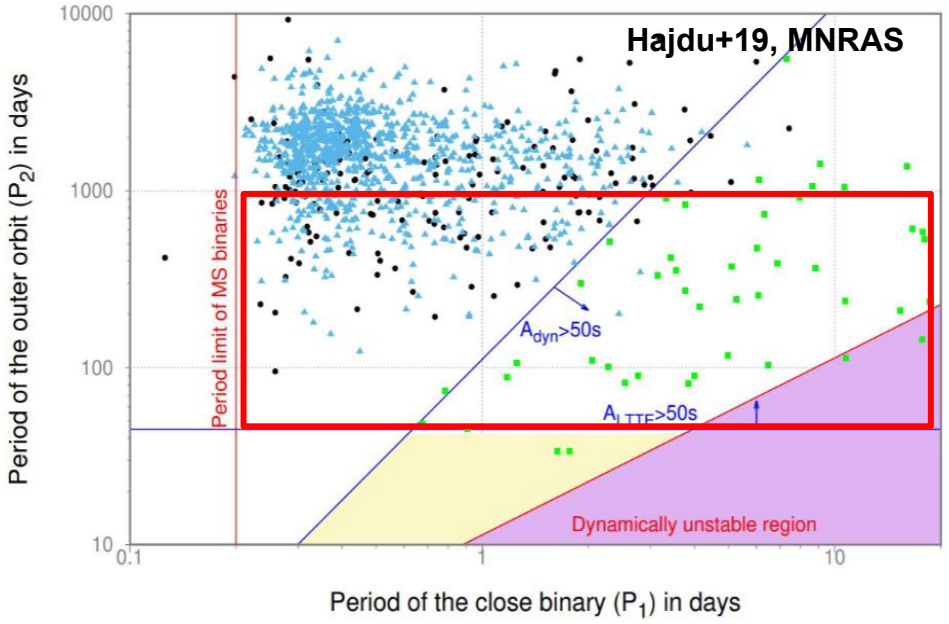
Can explain exotic evolutionary phases

Compact Hierarchical Triples



Observable Dynamical Changes





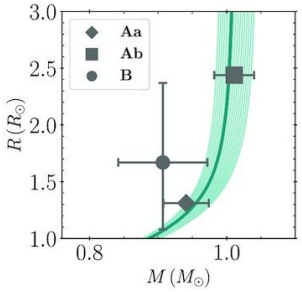
Considered rare, more recent discoveries

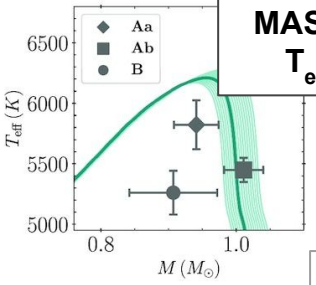
Evolution and Mergers

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY
MNRAS 521, 1908–1923 (2023)
Advance Access publication 2023 March 06
https://doi.org/10.1093/mnras/stad622

Detached eclipsing binaries in compact hierarchical triples: triple-lined systems BD+442258 and KIC 06525196

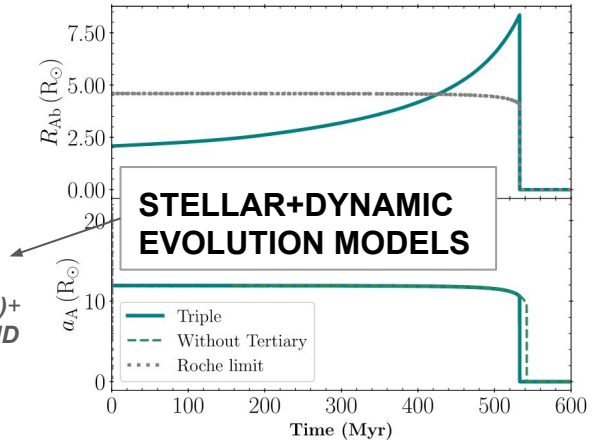
Ayush Moharana,[1]★ K. G. Hełminiak,[1] F. Marcadon,[1,2] T. Pawar,[1] M. Konacki,[3] N. Ukita,[4,5] E. Kambe[6] and H. Maehara[4]
[1]Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences, ul. Rabiańska 8, PL-87-100 Toruń, Poland





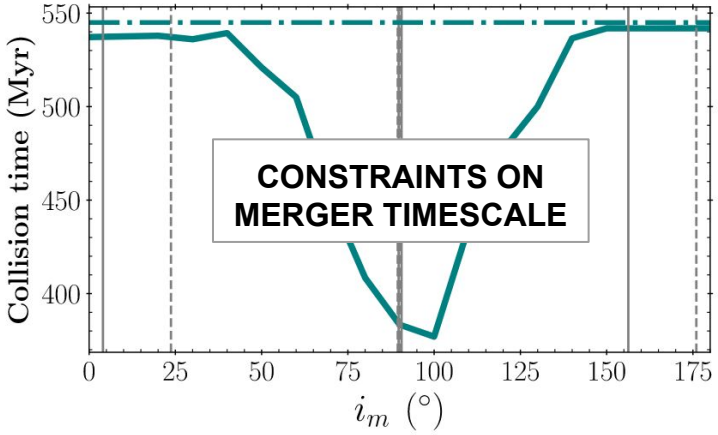
INDEPENDENT MASS, RADII, T_{eff}, [M/H]

LC + RV + Spectral Disentangling + Spectral Analysis



STELLAR+DYNAMIC EVOLUTION MODELS

MESA (Paxton+)+ REBOUND (Rein+)



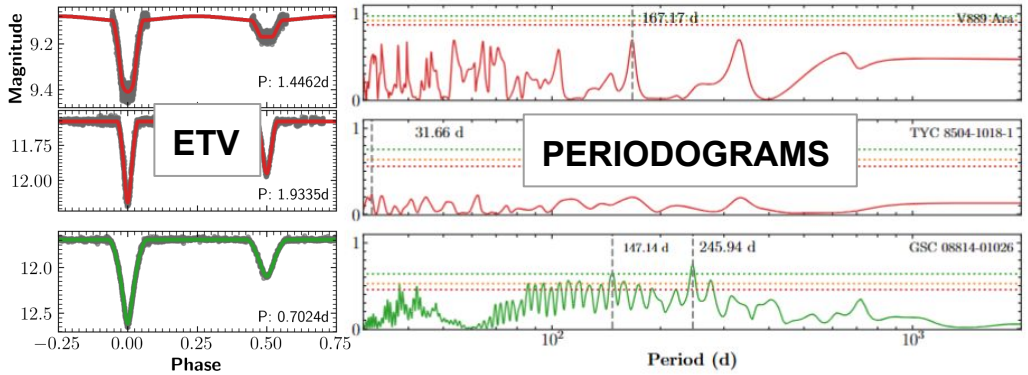
CONSTRAINTS ON MERGER TIMESCALE

Detections

Monthly Notices of the ROYAL ASTRONOMICAL SOCIETY
MNRAS 527, 53–65 (2024)
Advance Access publication 2023 October 17
https://doi.org/10.1093/mnras/stad3117

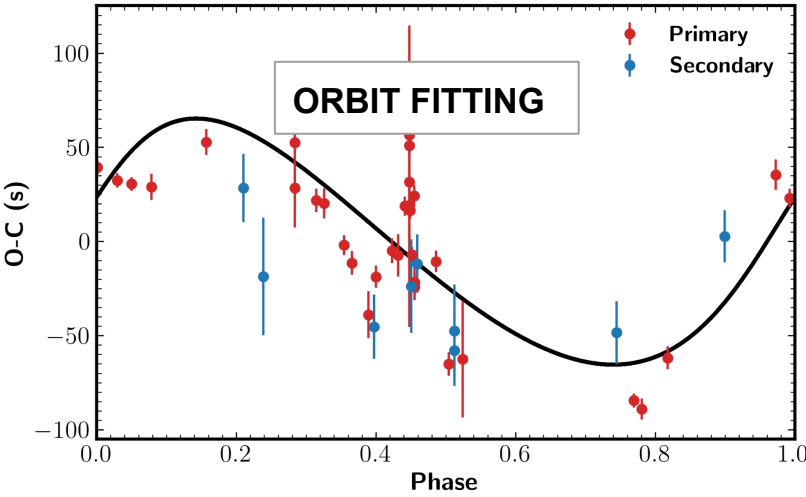
Solaris photometric survey: Search for circumbinary companions using eclipse timing variations

A. Moharana,[1]★ K. G. Hełminiak,[1] F. Marcadon,[2] T. Pawar,[1] G. Pawar,[1] P. Garczyński,[3] J. Perła,[4] S. K. Kozłowski,[5] P. Sybilski,[6] M. Ratajczak[7] and M. Konacki[8]
[1]*Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences, ul. Rabiańska 8, 87-100 Toruń, Poland*



GSC 00814-01026

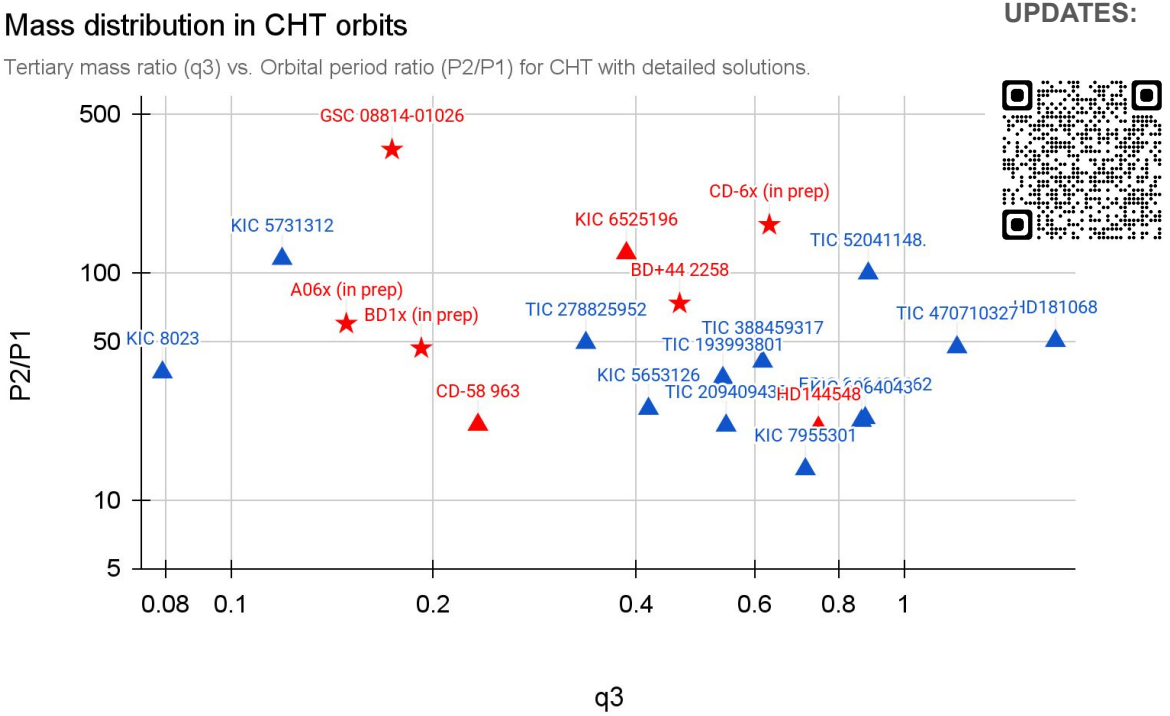
P_{out} = 245.0 ± 0.3 d e_{out} = 0.32 ± 0.04 $M_{tertiary}$ = 0.27 ± 0.01 $M_\odot$*



Current Status

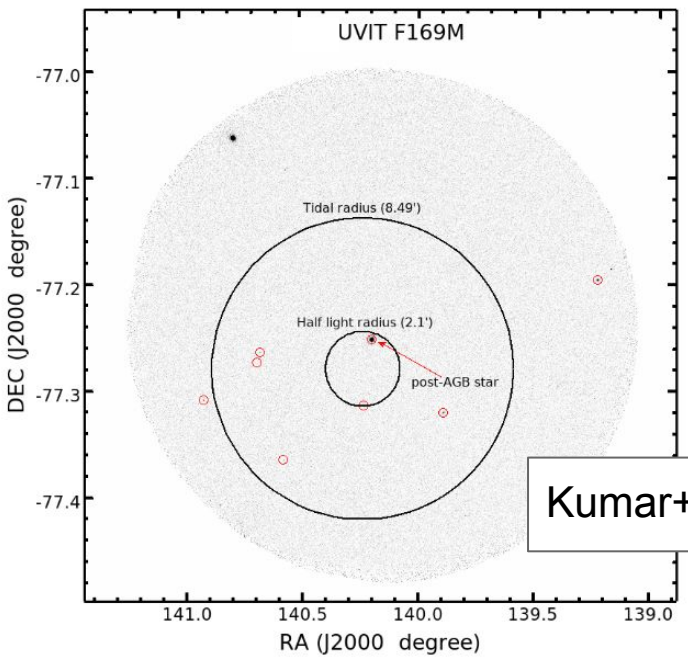
of CHT with masses, radii, T_{eff} , [M/H] measurements

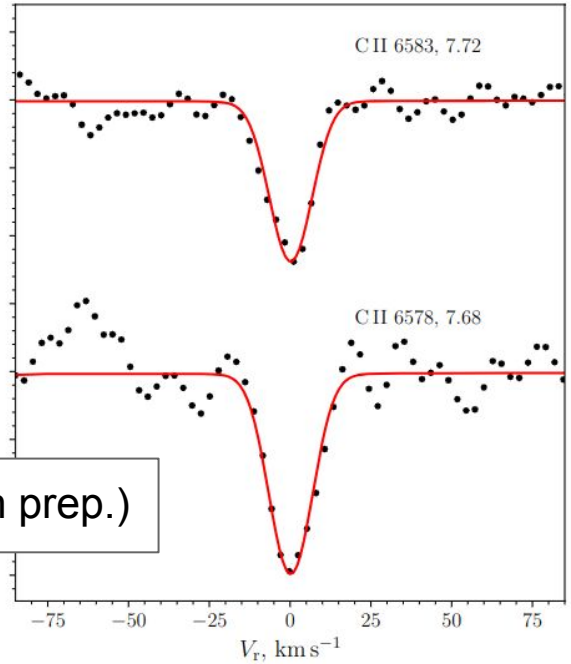
- ▲ - CHT in literature
- ▲ - CHT followed up spectroscopically in our program
- ★ - CHT discovered by us



FOLLOW OUR UPDATES:

Hot stars in Globular Clusters





Kumar+ (in prep.)

UVIT photometry + CHIRON spectroscopy

Summary

Publications:
- 3 accepted **(2 First Author)**

Grant management:
- **PRELUDIUM**
  Into 3rd year

Observing programmes:
- Final Semester on HRS on SALT **(PI)**
- 60 hrs on CHIRON on CTIO **(via PRELUDIUM)**
- TESS GI Cycle 6 **(Co-I)**

Conferences:
- Impact of Binaries on Stellar Evolution, November 2022, Munich **(P)**
- SALT Science Conference, June 2023, Warsaw **(T)**
- PLATO Science Conference, June 2023, Milazzo **(P)**
- Alpha Cen Systems, June 2023, Nice-Online **(T)**
- EAS 2023, July 2023, Krakow **(2T)**
- 41 Zjazd PTA, September 2023,Toruń **(1T 1P)**
- International meeting on Eclipsing Binaries, Paris-Online **(T)**

T=Talks **P**=Posters **TOTAL = 6 Talks 3 Posters**

UPDATES ON CHTs: