AYUSH MOHARANA

Doctoral Candidate at Nicolaus Copernicus Astronomical Center

ayushm@ncac.torun.pl | camk.edu.pl/en/people/staff/ayushm/
Rabianska 8, Torun, Poland. 87100 | 0000-0002-9616-512X | @observers_bias
ayush-moharana-004385134 | github.com/ayushmoharana

Interested in observations of eclipsing binaries and low-mass stars.

EXPERIENCE

Doctoral Candidate
Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences
December 2019 - Present **Supervisor: Dr. hab. K.G. Hełminiak**

Junior Research Fellow
National Institute of Technology, Rourkela, India
August 2019 - October 2019 **Supervisor: Dr. A.C. Pradhan**

Research Intern
Manipal Centre for Natural Science, India
May 2017 - July 2017 **Supervisor: Dr. D. Bhattacharya**

PUBLICATIONS

Journal Articles

- **A. Moharana**, K. G. Hełminiak, F. Marcadon, *et al.*, "Solaris photometric survey: Search for circumbinary companions using eclipse timing variations," *MNRAS*, 2023. DOI: 10.1093/mnras/stad3117.
- **A. Moharana**, K. G. Hełminiak, F. Marcadon, *et al.*, "Detached eclipsing binaries in compact hierarchical triples: triple-lined systems BD+442258 and KIC06525196," *MNRAS*, vol. 521, no. 2, pp. 1908–1923, Mar. 2023. DOI: 10.1093/mnras/stad622.
- F. Kahraman Aliçavuş, T. Pawar, K. G. Hełminiak, *et al.*, "Comprehensive spectroscopic and photometric study of pulsating eclipsing binary star AIHya," *MNRAS*, vol. 520, no. 2, pp. 1601–1612, Jan. 2023. DOI: 10.1093/mnras/stad137.
- M. Rozyczka, I. B. Thompson, A. Dotter, *et al.*, "The Cluster Ages Experiment (CASE) - IX. Analysis of four detached eclipsing binaries in the globular cluster NGC 3201,", vol. 517, no. 2, pp. 2485–2501, Dec. 2022. DOI: 10.1093/mnras/stac2751.
- K. G. Hełminiak, **A. Moharana**, T. Pawar, *et al.*, "Orbital and physical parameters of eclipsing binaries from the ASAS catalogue - XII. A sample of systems with K2 photometry,", vol. 508, no. 4, pp. 5687–5708, Dec. 2021. DOI: 10.1093/mnras/stab2963.
- R. Kumar, A. C. Pradhan, A. Mohapatra, *et al.*, "Ultraviolet Imaging Telescope (UVIT) observation of the Galactic globular cluster NGC 7492,", vol. 502, no. 1, pp. 313–327, Mar. 2021. DOI: 10.1093/mnras/staa4032.
- J. Korth, **A. Moharana**, M. Pešta, D. R. Czavalinga, and K. E. Conroy, "Consequences of parameterization choice on eclipsing binary light curve solutions," *Contributions of the Astronomical Observatory Skalnate Pleso*, vol. 51, no. 1, pp. 58–67, Jan. 2021. DOI: 10.31577/caosp.2021.51.1.58.

Conference Proceedings

EDUCATION

Integrated M.Sc. in Physics
National Institute of Technology, Rourkela
August 2014 – June 2019

PROJECTS

Evolution of Tight Triple Systems
Extracting accurate parameters of all three stars in a close (<5AU) triple system and using them to study stellar and dynamical evolution. On-going.

Eclipse timing variations using Solaris network
Developed the photometric pipeline to generate lightcurves for 100+ targets spanning 5 years and 4 telescopes to look for tertiary companions to eclipsing binaries through the Solaris network of robotic telescopes. On-going.

UV photometry from UVIT-Astrosat
Study of properties of hot stars in the globular clusters with UV observations from Ultraviolet Imaging Telescope and estimating the structural parameters of the Milky Way disk and halo using theoretical star counts from the Besancon model. 2017-2021.

Constraining physical parameters of Blazar Jets
Constraining the parameters of a leptonic blazar jet by using a inverse-problem solver code and broadband observations. 2017-2018.

FELLOWSHIPS AND GRANTS

NCN PRELUDIUM
PI of a 3yr (40k EUR) grant from National Science Center, Poland

NCN OPUS Fellowship
Additional fellowship for PhD studies

ISRO Junior Research Fellow
Fellowship for 1yr project funded by Indian Space Research Organisation. 2019.

- F. Marcadon, **A. Moharana**, T. Pawar, *et al.*, "Search for low-mass star companions around short-period eclipsing binaries: the case of RX Gru," in *American Astronomical Society Meeting Abstracts*, ser. American Astronomical Society Meeting Abstracts, vol. 55, Jan. 2023, 302.02, p. 302.02.
- **A. Moharana**, K. G. Hełminiak, F. Marcadon, T. Pawar, and M. Konacki, "Evolution and Dynamics of Tight Triple Systems," in *XL Polish Astronomical Society Meeting*, E. Szuszkiewicz, A. Majczyna, K. Małek, *et al.*, Eds., vol. 12, Oct. 2022, pp. 198–201.
- K. G. Hełminiak, F. Marcadon, **A. Moharana**, T. Pawar, and M. Konacki, "TESS photometry of crème de la crème of Eclipsing Binaries," in *XL Polish Astronomical Society Meeting*, E. Szuszkiewicz, A. Majczyna, K. Małek, *et al.*, Eds., vol. 12, Oct. 2022, pp. 163–166.
- T. Pawar, K. G. Hełminiak, R. Singh Rathour, **A. Moharana**, and M. Konacki, "AI Hydrae: Revisiting our pulsator friend," in *XL Polish Astronomical Society Meeting*, E. Szuszkiewicz, A. Majczyna, K. Małek, *et al.*, Eds., vol. 12, Oct. 2022, pp. 189–192.
- S. P. Ghosh, K. C. Das, N. Tripathy, *et al.*, "Synthesis of copper doped Zinc oxide nanowires with enhanced ultraviolet photoresponse behavior," in *Materials Science and Engineering Conference Series*, ser. Materials Science and Engineering Conference Series, vol. 178, Feb. 2017, p. 012 021. DOI: 10.1088/1757-899X/178/1/012021.

TALKS AND POSTERS

- **Contributed talk** at Polish Astronomical Society meeting, Torun, September 2023
- Poster at Polish Astronomical Society meeting, Torun, September 2023
- **Contributed talk** at European Astronomical Society meeting, Krakow, July 2023. Session: LS11- Evolving Observations of Binary Stars
- **Contributed talk** at European Astronomical Society meeting, Krakow, July 2023. Session: S11- Stellar interactions
- **Contributed talk** at Alpha Cen Systems: Towards new worlds, Nice, June 2023
- Poster at PLATO Stellar Science Conference, Milazzo, June 2023
- **Contributed talk** at Science highlights from SALT, Warsaw, June 2023
- Poster at Impact of Binaries on Stellar Evolution (ImBaSE), Munich Institute for Astro, Particle and Bio-physics, Munich, Germany, November 2022.
- **Contributed talk** at STARS 2020, Institute of Astronomy, University of Cambridge, UK. August 2022.
- Poster at 40th Meeting of the Polish Astronomical Society, Online-Szczeszin, Poland. September 2021.
- Poster at the TESS Science Conference 2, MIT, Online. August 2021.

OUTREACH

- Talk at Young Astronomers meet, Warsaw, March 2022.
- Talk on "Measuring Stars with Eclipsing Binaries" at Astronomy Students' Scientific Association, NCU Torun, May 2021.
- Popular science talk on "Multiple Star systems" at National Institute of Technology, Rourkela, 2020.
- Astronomy workshop for rural kids, Chandbali, November 2019.
- Organising team of WARPED (Astronomy and Space Science fair for school children), Rourkela, August 2017.

OBSERVING RUNS

S **CHIRON, CTIO**
PI for 60hrs of spectroscopic observations obtained using PRELUDIUM funding. Ongoing.

S **HRS, SALT**
PI of a 4-semester monitoring programme. Ongoing.

P **TESS GIP**
Co-PI of TESS Guest Investigator Programmes. 2020, 2022, 2023.

P **TESS DDT**
Co-PI of 1 TESS Director's Discretionary Time run. 2020.

CODES AND TECHNIQUES

Python | FORTRAN | TOPCAT | PHOEBE2 | iSPEC | REBOUND | JKTEBOP

Eclipsing Binary Lightcurve Modelling | Radial Velocity Modelling | Spectral Analysis | Spectral Disentangling | Numerical Integration

LANGUAGES

English
Odia (Native)
Hindi
Sanskrit

ADDITIONAL SKILLS

Graphic Designing | Video Editing

REFERENCES

Prof. K.G. Hełminak
@ xysiek@ncac.torun.pl
Nicolaus Copernicus Astronomical Center, Polish Academy of Science, Torun, Poland

Prof. M. Konacki
@ maciej@ncac.torun.pl
Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences, Warsaw, Poland

Prof. T. Kaminski
@ tomkam@ncac.torun.pl
Nicolaus Copernicus Astronomical Center, Polish Academy of Science, Torun, Poland