

AYUSH MOHARANA

Doctoral Candidate at Nicolaus Copernicus Astronomical Center

✉ ayushm@ncac.torun.pl
@observers_bias

✉ Rabianska 8, 87100
ayushmoharana

📍 Torun, Poland
github.com/ayushmoharana

📞 0000-0002-9616-512X



Interested in observations of eclipsing binaries.

EXPERIENCE

Doctoral Candidate

📍 Nicolaus Copernicus Astronomical Center, Polish Academy of Sciences
📅 December 2019 - Present **Supervisor: Dr. K.G. Helminiak**

Junior Research Fellow

📍 National Institute of Technology, Rourkela, India
📅 August 2019 - October 2019 **Supervisor: Dr. AC Pradhan**

Research Intern

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

PROJECTS

Evolution of Tight Triple Systems

📍 Nicolaus Copernicus Astronomical Center, Torun, Poland
Extracting accurate parameters of all three stars in a close ($<5\text{AU}$) triple system and using them to study stellar and dynamical evolution.

Eclipse timing variations using Solaris network

📍 Nicolaus Copernicus Astronomical Center, Torun, Poland
Using long-term eclipse timing variations to look for tertiary companions to eclipsing binaries through the Solaris network of robotic telescopes. Developed the photometric pipeline to generate lightcurves for 100+ targets spanning 5 years and 4 telescopes.

Morphology of Galactic Disk using UV star counts

📍 National Institute of Technology, Rourkela, India
Estimating the structural parameters of the Milky Way disk and halo using theoretical star counts from the Besancon model along with the observed UV star counts from UVIT and GALEX UV surveys.

Ultraviolet Analysis of Galactic Globular Clusters using UVIT Observations

📍 National Institute of Technology, Rourkela, India
Study of properties of hot stars in the globular clusters with UV observations from Ultraviolet Imaging Telescope.

Constraining physical parameters of Blazar Jets

📍 Manipal Center for Natural Sciences, Manipal, India
Constraining the parameters of a leptonic blazar jet by using an inverse-problem solver code and broadband observations.

PUBLICATIONS

Journal Articles

- F. Kahraman Aliçavuş, T. Pawar, K. G. Helminiak, *et al.*, "Comprehensive spectroscopic and photometric study of pulsating eclipsing binary star AI Hya", vol. 520, no. 2, pp. 1601–1612, Apr. 2023. DOI: 10.1093/mnras/stad137. arXiv: 2301.04409 [astro-ph.SR].

EDUCATION

Integrated M.Sc. in Physics

📍 National Institute of Technology, Rourkela
📅 August 2014 – June 2019

FELLOWSHIPS AND GRANTS

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

🏆 **NCN OPUS Fellow**
Additional fellowship for PhD studies

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

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 Programme. 2020.

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

CODES AND TECHNIQUES

Python

FORTRAN

TOPCAT

PHOEBE2

iSPEC

REBOUND

Eclipsing Binary Lightcurve Modelling

Radial Velocity Modelling

Spectral Analysis

Spectral Disentangling

Numerical Integration

- **A. Moharana**, K. G. Hełminiak, F. Marcadon, *et al.*, “Detached eclipsing binaries in compact hierarchical triples: triple-lined systems BD+442258 and KIC 06525196,” vol. 521, no. 2, pp. 1908–1923, May 2023. DOI: 10.1093/mnras/stad622. arXiv: 2303.05272 [astro-ph.SR].
- 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. arXiv: 2110.05961 [astro-ph.SR].
- J. Korth, **A. Moharana**, M. Pešta, D. R. Czaulanga, and K. E. Conroy, “Consequences of parameterization choice on eclipsing binary light curve solutions,” *Contributions of the Astronomical Observatory Skalnaté Pleso*, vol. 51, no. 1, pp. 58–67, Jan. 2021. DOI: 10.31577/caosp.2021.51.1.58.
- 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. arXiv: 2012.13712 [astro-ph.GA].

Conference Proceedings

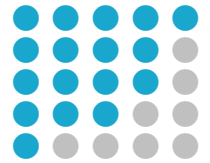
- F. Marcadon, **A. Moharana**, T. Pawar, *et al.*, “Search for low-mass star companions around short-period eclipsing binaries: the case of RX Gru,” in *American Astronomical Society Meeting Abstracts*, ser. American Astronomical Society Meeting Abstracts, vol. 55, Jan. 2023, 302.02, p. 302.02.
- K. 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.
- **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.
- 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 photoreponse behavior,” in *Materials Science and Engineering Conference Series*, ser. Materials Science and Engineering Conference Series, vol. 178, Feb. 2017, p. 012021. DOI: 10.1088/1757-899X/178/1/012021.

TALKS AND POSTERS

- Poster at Impact of Binaries on Stellar Evolution (ImBaSE), Munich Institute for Astro, Particle and Bio-physics, Munich, Germany. 14-18 November 2022.
- Contributed talk at STARS 2020, Institute of Astronomy, University of Cambridge, UK. 17 August 2022.
- Poster at 40th Meeting of the Polish Astronomical Society, Online-Szczecin, Poland. September 2021.
- Poster at the TESS Science Conference 2, MIT, Online. August 2021.

LANGUAGES

English
Odia
Hindi
Sanskrit
Polish



ADDITIONAL SKILLS


Graphic Designing

Video Editing

REFEREES

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. A.C. Pradhan

@ pradhana@nitrrkl.ac.in

 National Institute of Technology, Rourkela, Odisha, India