Pavan Vynatheya

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Research Experience

Max Planck Institute for Astrophysics — *Garching, Germany*

PhD candidate — *Sep. 2020 - May. 2024*

Supervisors: Adrian S. Hamers, Rüdiger Pakmor, Taeho Ryu, Selma de Mink

Research: Compact object mergers in quadruple-star systems; Stability of triples and quadruples; Tidal disruptions of stars by black holes

Inter-University Centre for Astronomy and Astrophysics — *Pune, India*

Master thesis — *Aug. 2019 - May. 2020*

Supervisor: Kanak Saha

Research: Pattern speeds of barred galaxies

University of Western Ontario — *London, Canada*

Mitacs Globalink Research Fellowship — *May. 2019 - Aug. 2019*

Supervisor: Pauline Barmby

Research: Deep-learning classification of galaxies by morphology

Brera Astronomical Observatory — *Merate, Italy*

Summer research internship — *May. 2018 - Jul. 2018*

Supervisor: Tomaso Belloni

Research: Quasi-periodic oscillations in an X-ray binary

Aryabhatta Research Institute of Observational Sciences — *Nainital, India*

Indian Academy of Sciences Summer Research Fellowship — *May. 2017 - Jul. 2017*

Supervisor: Saurabh Sharma

Research: Search for young stellar objects in a star forming region

Indian Institute of Astrophysics — *Bengaluru, India*

Summer research internship — *Jun. 2016 - Jul. 2016*

Supervisor: Annapurni Subramaniam

Research: Color-magnitude diagrams of star clusters

Education

Max Planck Institute for Astrophysics — *Garching, Germany*

PhD candidate in Astronomy — *Sep. 2020 - May. 2024*

Part of the International Max Planck Research School (IMPRS) Munich program

Degree to be granted by the Ludwig Maximilian University of Munich

Indian Institute of Science Education and Research (IISER) Kolkata — *Mohanpur, India*

BS-MS dual degree in Physics (DST INSPIRE Fellow) — *Aug. 2015 - Jul. 2020*

Major in Physics + Minor in Mathematics

Cumulative Grade Point Average: 9.19 out of 10

Awards & Fellowships

2023	**Poster Award,** 3,2,1: Massive Triples, Binaries and Mergers conference – poster on the dynamical stability of triple- and quadruple-star systems	*Leuven, Belgium*
2022	**Kippenhahn Award**, Best PhD student paper in 2021 at the Max Planck Institute for Astrophysics – paper on gravitational wave progenitors in quadruple-star systems	*Garching, Germany*
2018	**Mitacs Globalink Research Internship,** Summer research at the University of Western Ontario	*London, Canada*
2017	**Indian Academy of Sciences Summer Research Fellowship,** Summer research at the Aryabhatta Research Institute of Observational Sciences	*Nainital, India*
2015-20	**Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship,** Awarded by the Department of Science and Technology to study science at IISER Kolkata for 5 years	*Mohanpur, India*

Publications

First author

4. *(in prep.)* **Vynatheya, P.**; Ryu, T.; Pakmor, R.; de Mink, S. E.; Perets, H. B.: 2023
   "What happens after a star is partially disrupted by a stellar-mass black hole?"
3. **Vynatheya, P.**; Mardling, R. A.; Hamers, A. S.: 2023, MNRAS, 525, 2388
   "Quadruple-star systems are not always nested triples: a machine learning approach to dynamical stability"
2. **Vynatheya, P.**; Hamers, A. S.; Mardling, R. A.; Bellinger, E. P.: 2022, MNRAS, 516, 4146
   "Algebraic and machine learning approach to hierarchical triple-star stability"
1. **Vynatheya, P.**; Hamers, A. S.: 2021, ApJ, 926, 195
   "How important is secular evolution for black hole and neutron star mergers in 2+2 and 3+1 quadruple-star systems?".

Co-author

2. Hamers, A. S.; Rantala, A.; Neunteufel, P.; Preece, H.; **Vynatheya, P.**: 2021, MNRAS, 502, 4479
   "Multiple Stellar Evolution: a population synthesis algorithm to model the stellar, binary, and dynamical evolution of multiple-star systems"
1. Bogensberger, D.; Ponti, G.; Jin, C.; Belloni, T. M.; Pan, H.; Nandra, K.; Russell, T. D.; Miller-Jones, J. C. A.; Muñoz-Darias, T.; **Vynatheya, P.**; Vincentelli, F.: 2021, MNRAS, 502, 4479
   "An underlying clock in the extreme flip-flop state transitions of the black hole transient Swift J1658.2-4242"

Skills

Astrophysics code	Multiple-star population synthesis: `MSE` (advanced), Moving-mesh hydrodynamics: `AREPO` (intermediate), *N*-body: `MSTAR` (intermediate), Detailed stellar evolution: `MESA` (basic)
Programming	`python` (advanced + machine learning), `C/C++` (intermediate), `MATLAB` (basic), `Mathematica` (basic), `Java` (basic)
Web design	`HTML` (advanced), `CSS` (advanced), `jQuery/Javascript` (intermediate), `PHP` (basic)
Languages	English (fluent), Kannada (native), Tamil (native), Hindi (fluent)

Talks & Workshops

Invited seminars

Sep. 2023	**Stars and Compact Objects group seminar**, Center for Computational Astrophysics, Flatiron Institute	*New York, USA*
Aug. 2023	**Theoretical Astrophysics Including Relativity group seminar**, Theoretical Astrophysics Including Relativity and Cosmology, California Institute of Technology	*Pasadena, USA*
Aug. 2023	**Stellar & Galactic Astronomy group seminar**, Division of Astronomy & Astrophysics, University of California Los Angeles	*Los Angeles, USA*
Jun. 2023	**Massive stars and stellar populations group seminar**, Anton Pannekoek Institute for Astronomy, University of Amsterdam	*Amsterdam, Netherlands*
Nov. 2022	**Astrophysical relativity group seminar**, International Centre for Theoretical Sciences	*Bengaluru, India*
Oct. 2022	**Galaxies, Stars & Cosmology group seminar**, Marseille Astrophysics Laboratory	*Marseille, France (online)*
Sep. 2022	**Astrophysics whiteboard session**, School of Physics & Astronomy, Monash University	*Clayton, Australia*
Jul. 2021	**Max Planck Institute for Astrophysics summer retreat**, Schloss Ringberg	*Kreuth, Germany*

Contributed talks

Sep. 2023	**"Two in a million" – The interplay between binaries and star clusters**, European Southern Observatory	*Garching, Germany*
Aug. 2023	**MODEST-23: Star clusters in the post-pandemic era**, Northwestern University	*Evanston, USA*
Apr. 2023	**Seminar on Stellar Astrophysics**, Max Planck Institute for Astrophysics	*Garching, Germany*
Oct. 2022	**Seminar on Stellar Astrophysics**, Max Planck Institute for Astrophysics	*Garching, Germany*
May. 2022	**Growing Black Holes: Accretion and Mergers**, Radisson Hotel Kathmandu	*Kathmandu, Nepal*
Jan. 2022	**Dynamical Formation of Gravitational Wave Sources**, Aspen Center for Physics	*Aspen, USA*
Oct. 2021	**Seminar on Stellar Astrophysics**, Max Planck Institute for Astrophysics	*Garching, Germany*

Schools

Jul. 2022	**Summer School for Astrostatistics at Crete**, Department of Physics, University of Crete	*Heraklion, Greece*
Aug. 2021	**NBIA Summer School on Gravitational Wave Astrophysics**, Niels Bohr International Academy, University of Copenhagen	*Copenhagen, Denmark*
Dec. 2018	**IIST Astronomy and Astrophysics School**, Indian Institute of Space Science and Technology	*Thiruvananthapuram, India*
Feb. 2017	**Telescope-making workshop**, Indian Institute of Science Education and Research Kolkata	*Mohanpur, India*
Dec. 2015	**Vijyoshi Science Camp**, Eastern Zonal Cultural Centre	*Kolkata, India*

Conference posters

Jul. 2023	**3,2,1: Massive Triples, Binaries and Mergers**, Katholieke Universiteit Leuven	*Leuven, Belgium*

Other Activities

2021-23	**Student representative**, International Max Planck Research School (IMPRS) Munich	*Garching, Germany*
2021-22	**Co-organizer**, Seminar on Stellar Astrophysics (SESTAS)	*Garching, Germany*
2018 and 2019	**Web designer**, International Genetically Engineered Machine (iGEM) competition - Gold medal winners in 2018 and 2019	*Boston, USA (did not attend)*
2016-17	**Web designer**, Inquivesta - Science fest of IISER Kolkata	*Mohanpur, India*
2016-17	**Convener**, IISER Kolkata Music club	*Mohanpur, India*

References

Dr. Adrian Hamers – *supervisor*
Max Planck Institute for Astrophysics, Germany
Contact: hamers@mpa-garching.mpg.de

Prof. Dr. Selma de Mink – *supervisor*
Max Planck Institute for Astrophysics, Germany
& Anton Pannekoek Institute for Astronomy, University of Amsterdam, Netherlands
Contact: demink_office@mpa-garching.mpg.de

Dr. Rüdiger Pakmor – *supervisor*
Max Planck Institute for Astrophysics, Germany
Contact: rpakmor@mpa-garching.mpg.de

Dr. Rosemary Mardling – *collaborator*
School of Physics and Astronomy, Monash University, Australia
Contact: rosemary.mardling@monash.edu