

# 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

### Aryabhata 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	<b>Poster Award</b> , 3,2,1: Massive Triples, Binaries and Mergers conference – poster on the dynamical stability of triple- and quadruple-star systems	Leuven, Belgium
2022	<b>Kippenhahn Award</b> , 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	<b>Mitacs Globalink Research Internship</b> , Summer research at the University of Western Ontario	London, Canada
2017	<b>Indian Academy of Sciences Summer Research Fellowship</b> , Summer research at the Aryabhata Research Institute of Observational Sciences	Nainital, India
2015-20	<b>Innovation in Science Pursuit for Inspired Research (INSPIRE) Fellowship</b> , 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

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

## Talks & Workshops

### CONFERENCE TALKS

Sep. 2023	<b>"Two in a million" – The interplay between binaries and star clusters</b> , European Southern Observatory	<a href="#">Garching, Germany</a>
Aug. 2023	<b>MODEST-23: Star clusters in the post-pandemic era</b> , Northwestern University	<a href="#">Evanston, USA</a>
May. 2022	<b>Growing Black Holes: Accretion and Mergers</b> , Radisson Hotel Kathmandu	<a href="#">Kathmandu, Nepal</a>
Jan. 2022	<b>Dynamical Formation of Gravitational Wave Sources</b> , Aspen Center for Physics	<a href="#">Aspen, USA</a>

### CONFERENCE POSTERS

Jul. 2023	<b>3,2,1: Massive Triples, Binaries and Mergers</b> , Katholieke Universiteit Leuven	<a href="#">Leuven, Belgium</a>
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### INVITED TALKS

Oct. 2022	<b>Galaxies, Stars &amp; Cosmology group seminar</b> , Marseille Astrophysics Laboratory	<a href="#">Marseille, France</a> (online)
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### CONTRIBUTED TALKS

Sep. 2023	<b>Stars and Compact Objects group seminar</b> , Center for Computational Astrophysics, Flatiron Institute	<a href="#">New York, USA</a>
Aug. 2023	<b>Theoretical Astrophysics Including Relativity group seminar</b> , Theoretical Astrophysics Including Relativity and Cosmology, California Institute of Technology	<a href="#">Pasadena, USA</a>
Aug. 2023	<b>Stellar &amp; Galactic Astronomy group seminar</b> , Division of Astronomy & Astrophysics, University of California Los Angeles	<a href="#">Los Angeles, USA</a>
Jun. 2023	<b>Massive stars and stellar populations group seminar</b> , Anton Pannekoek Institute for Astronomy, University of Amsterdam	<a href="#">Amsterdam, Netherlands</a>
Nov. 2022	<b>Astrophysical relativity group seminar</b> , International Centre for Theoretical Sciences	<a href="#">Bengaluru, India</a>
Sep. 2022	<b>Astrophysics whiteboard session</b> , School of Physics & Astronomy, Monash University	<a href="#">Clayton, Australia</a>
Jul. 2021	<b>Max Planck Institute for Astrophysics summer retreat</b> , Schloss Ringberg	<a href="#">Kreuth, Germany</a>

## INSTITUTE TALKS

Apr. 2023	<b>Seminar on Stellar Astrophysics</b> , Max Planck Institute for Astrophysics	Garching, Germany
Oct. 2022	<b>Seminar on Stellar Astrophysics</b> , Max Planck Institute for Astrophysics	Garching, Germany
Oct. 2021	<b>Seminar on Stellar Astrophysics</b> , Max Planck Institute for Astrophysics	Garching, Germany

## SCHOOLS

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

## Other Activities

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