Kartik Rajan Neralwar

Education

07/2021–Present **Ph.D. student**, International Max Planck Research School (IMPRS), *Max Planck Institute for Radio Astronomy (MPIfR) and Universität Bonn*, Germany
Thesis: "Understanding the effects of stellar feedback on ISM using STARFORGE simulation"; advisors: Dr. Dario Colombo; Prof. Dr. Karl Menten, Prof. Dr. Pavel Kroupa; expected submission in June 2025.

09/2018–01/2021 **Masters of Science (Astrophysics)**, *Universität Bonn*, Germany
Thesis: "The SEDIGISM survey: Morphology of molecular clouds"; advisors: Dr. Dario Colombo; Prof. Dr. Karl Menten, Prof. Dr. Pavel Kroupa.

07/2015–06/2018 **Bachelor of Science (specialisation in Physics)**, *Fergusson College*, Pune, India
Thesis: "Finding observational proxies for the forces acting during the initiation stage of Coronal Mass Ejections (CMEs)"; advisors: Dr. K. Sasikumar Raja and Prof. Dr. Prasad Subramanian at IISER Pune

Publications

First authored

2024 **Effects of stellar feedback on cores in STARFORGE**, *Astronomy & Astrophysics*, accepted, 2024arXiv240905949N, K. R. Neralwar, D. Colombo, S. Offner, F. Wyrowski, K. M. Menten, A. Karska, M. Y. Grudić, S. Neupane

2022 **The SEDIGISM survey: Molecular cloud morphology. II. Integrated source properties**, *Astronomy & Astrophysics*, Volume 664, id.A84, 27 pp., K. R. Neralwar, D. Colombo, A. Duarte-Cabral, J. S. Urquhart and 20 others

2022 **The SEDIGISM survey: Molecular cloud morphology. I. Classification and star formation**, *Astronomy & Astrophysics*, Volume 663, id.A56, 39 pp., K. R. Neralwar, D. Colombo, A. Duarte-Cabral, J. S. Urquhart and 21 others

Co-authored

2022 **The SEDIGISM survey: The influence of spiral arms on the molecular gas distribution of the inner Milky Way**, *Astronomy & Astrophysics*, Volume 658, id.A54, 38 pp., D. Colombo, A. Duarte-Cabral, A. R. Pettitt, and 23 others
Participated in discussions on the morphologies of clouds in interarm and spiral arm regions during the preparation of the manuscript.

2023 **Large-scale velocity-coherent filaments in the SEDIGISM survey: Association with spiral arms and the fraction of dense gas**, *Astronomy & Astrophysics*, Volume 675, id.A119, 28 pp., Y. Ge, K. Wang, A. Duarte-Cabral and 15 others
Strengthened cloud classification as filaments suggesting the use of SEDIGISM cloud morphologies, proposed the addition of SEDIGISM cloud IDs for better reference, and corrected plot visualisations.

Experience

Outreach

06/2024–09/2024 **Organiser and lecturer**, Deep learning in Astrophysics *workshop series*, Regionales Rechenzentrum der Universität zu Köln, Germany
Organised two workshops on Deep learning in Astrophysics and gave a lecture on the topic "Introduction to deep learning"

2016–2018 **Member**, *Astro club*, Fergusson College, Pune, India
Organised students' seminars, exibitions and poster presentations related to astronomy as a member of Astro Club.

Teaching and Tutoring

09/2023–02/2024 **Tutor**, Statistical methods for astrophysics and cosmology, University of Bonn, Germany
Tutored the course astro8506: Statistical methods for astrophysics and cosmology for M.Sc. Astrophysics.

05/2016–04/2017 **Fellow**, Science Education Initiative (SEI), Pune, India
Taught science and mathematics to students in grade 5 in a government school in Pune. Trained fellow inductees at Science Education Initiative (SEI) in basic physics.

Telescope observations

12/2022 **APEX telescope**, Telescope observer, Atacama, Chile
Assisted the telescope operators at APEX telescope as an observer.

Internships

05/2016–08/2016 **Summer Intern**, *Dr. K. Sasikumar Raja*, IISER, Pune, India
Design and characterisation of a low-frequency log-periodic dipole antenna (LPDA) to monitor radio transient emissions from the solar corona using high-frequency structure simulator (HFSS).

Supervision of students

Internship	*"CASI-3D U-Net for ^{13}CO Bubbles Prediction"*
Candidate	Rushil R. Malode
Supervisors	K. R. Neralwar, D. Colombo
Period	June 2024 – July 2024
Internship	*"Identification of Stellar Feedback features in STARFORGE Simulation"*
Candidate	Suryansh Patidar
Supervisors	D. Colombo, K. R. Neralwar
Period	May 2024 – June 2024

Oral and poster presentations

07/2023 Oral presentation and poster on **Identification of stellar wind signatures in the Milky Way using the CASI-3D CNN algorithm** at National Astronomical Meetings, Cardiff, UK and at the European Astronomical Society meeting, Krakow, Poland, respectively.

06/2022 Poster on **A machine oriented hunt for feedback in Milky Way** at From Stars to Galaxies II, Sweden.

02/2020 Poster on **Morphological classification of molecular clouds** at APEX 2020 meeting, Schloss Ringberg, Tegernsee, Kreuth.

06/2019 Paper presentation on **An intuitive 3D map of the Galactic warp's precession traced by classical Cepheids** at AlfA, Bonn, Germany.

02/2017 Poster on **The multiwavelength observations of Sun** at Inter-University Centre for Astronomy and Astrophysics (IUCAA) on National Science Day.

Computer skills

Programming PYTHON 2 & 3, BASH

Packages yt, scikit-learn, tensorflow, pytorch, astrodendro, pandas, matplotlib, seaborn

Astrophysical Software RADMC-3D, Common Astronomy Software Applications (CASA), High Frequency Structure Simulator (HFSS), Modules for Experiments in Stellar Astrophysics (MESA)

Others Slurm data scheduler, wandb.ai

Languages

- Marathi (mother-tongue)
- Hindi
- English
- German (B1)

Lifelong learning

08/2023 **Carl-Zeiss-Stiftung-Summer-School 2023** , *Heidelberg*, Germany

05/2023 **AI for Science - Bootcamp with NVIDIA**, *Max Planck Computation and Data Facilities*, Germany, (attended online)

01/2023 **Machine learning in Python with scikit-learn**, *FUN-MOOC*, France Université Numérique, Online course

11/2022 **Python for HPC workshop**, *Max Planck Computation and Data Facilities*, Germany, (attended online)

10/2022 **ASTRO HACK WEEK 2022 workshop**, *Heidelberg*, Germany, (attended online)

08/2017 **Python Programming: A Concise Introduction**, *Coursera*, Wesleyan University, Online course

05/2017 **Programming for Everybody (Getting Started with Python)**, *Coursera*, University of Michigan, Online course

04/2017 **Confronting The Big Questions: Highlights of Modern Astronomy**, *Coursera*, University of Rochester, Online course