Parth Pavaskar

PhD Candidate
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Education

Ph.D in Theoretical Astroparticle Physics — **09.2021 – Present**
Deutsches Elektronen-Synchrotron & Universität Potsdam — *Expected Completion – 08.2025*

Thesis (tentative)*: Compressibility in magneto-hydrodynamic turbulence*
Supervisors*: Prof. Dr. Huirong Yan, Prof. Dr. Tim Dietrich*

Master of Science in Astro & Particle Physics — **10.2018 – 01.2021**
Eberhard Karls Universität Tübingen — *Final Grade – 1.3*

Thesis*: UV Spectral Analysis of K648, the Central Star of Planetary Nebula Ps1 in the Globular Cluster M15*
Supervisors*: Prof. Dr. Klaus Werner, Dr. Thomas Rauch*

Bachelor of Science in Physics — **08.2015 – 04.2018**
Savitribai Phule Pune University — *Grade – First Class w/ Distinction*

Major*: Physics (Astronomy & Astrophysics, Lasers & Optics)*
Minor*: Mathematics, Statistics*

Academic Training

Erlangen Astroparticle School — **10.2022**
Erlangen Centre for Astroparticle Physics (ECAP), Erlangen, Germany

- Graduate school focusing on Astroparticle and Gamma-ray physics.

Fundamentals of Particle-In-Cell Simulations — **08.2021 – 11.2021**
Particle In Cell Consulting LLC (online)

- Programming course on the particle-in-cell method for Plasma Simulations.

Visiting Research Student — **04.2021 – 08.2021**
Deutsches Elektronen-Synchrotron (DESY), Zeuthen, Germany

- Visiting reseacrh student position in collaboration with the Astroparticle Theory group (THAT) at DESY Zeuthen.

FORTRAN for Scientific Computing — **12.2019**
High-Performance Computing Center Stuttgart (HLRS), Stuttgart, Germany (online)

- Programming course for scientific applications with Fortran.

Skills

Programming Languages Julia, Python, FORTRAN, C, C++, MATLAB, C#, VHDL, R

Softwares and Technical 4 years of experience in Astrophysical Plasma simulations and High Performance Computing (HPC). Experience in implementing MPI parallelization, Adaptive Mesh Refinement (AMR), Adaptive Time-stepping (ATS) and large data handling.

- **Athena++** for isothermal ideal MHD and kinetic-MHD hybrid simulations
- **Pluto**, **ZeusMP** for compressible MHD
- **PENCIL** for incompressible MHD
- **Gkeyll**, **iPIC3D**, **Smilei** for particle-in-cell (PIC) simulations
- **CRpropa3** for cosmic ray test particle simulations and diffusion modelling.
- **TMAP** for NLTE radiative transfer modelling of stellar atmospheres.

Languages English (fluent), Hindi (fluent), Marathi (native)
German (basic), Sanskrit (basic)

Computing Time

NHR-ZIB Project bbp00076 (PI) **01.2025 – 01.2026**
Awarded **5 million cpu-hours** on the supercomputer LISE hosted at the Zuse-Institute Berlin (ZIB), governed by the ”Nationales Hochleistungsrechnen” (German National HPC Alliance).

NHR-ZIB Project bbp00066 (PI) **04.2023 – 04.2024**
Awarded **35 million cpu-hours** on the supercomputer LISE & EMMY hosted at the Zuse-Institute Berlin (ZIB), governed by the ”Nationales Hochleistungsrechnen” (German National HPC Alliance).

HLRS Project ”MHDscalingATHENA” (PI) **08.2024 – 12.2024**
Awarded **0.5 million cpu-hours** on the supercomputer HAWK hosted at the HPC Center Stuttgart (HLRS) for performing high resolution scaling tests with the MHD code ATHENA++, subject to extension to a full project.

NHR-ZIB Project bbp00065 (co-PI) **04.2023 – 04.2024**
Awarded **32 million cpu-hours** on the supercomputer LISE hosted at the Zuse-Institute Berlin (ZIB), governed by the ”Nationales Hochleistungsrechnen” (German National HPC Center).

HLRN Project bbp00062 (co-PI) **04.2022 – 04.2023**
Awarded **13 million cpu-hours** on the supercomputer KONRAD hosted by the North-German HPC Cetner (HLRN, now part of NHR).

Teaching Experience

Thesis mentoring of Mr. Percy Martinez (M.Sc Astrophysics, Uni. Potsdam) **10.2024 – present**
Master thesis titled ”Damping of kinetic Fast mode MHD waves in turbulent particle-in-cell simulations”.

Tutoring for M.Sc Astrophysics (University of Potsdam) **Winter semester 2023-24**
Tutoring for the course "Physical Processes in Astrophysics".

Mentoring of Mr. Maksym Riabokon (DESY Ukraine Winter School 2023) **01.2023 – 03.2023**
Intern project titled "Cosmic-ray diffusion in decomposed linear modes of MHD turbulence".

Mentoring of Mr. Ninad Khobrekar (DESY Summer Intern 2022) **07.2022 – 09.2022**
Intern project titled "Dependence of MHD mode energy fractions on the driving mechanism of turbulence in MHD simulations".

Publications

Diagnostics of magnetohydrodynamic modes in the ISM through synchrotron polarization statistics **ApJ 971 58** **2024**
***Parth Pavaskar**, Ka Ho Yuen, Huirong Yan, Sunil Malik*

Magnetic field measurement from the Davis–Chandrasekhar–Fermi method employed with atomic alignment **MNRAS 523 1 1056–1066** **2023**
***Parth Pavaskar**, Huirong Yan, Jungyeon Cho*

Talks

ASTRONUM 2024, La Rochelle, France **01.07.2024**
Diagnostics of magnetohydrodynamic modes in the ISM through synchrotron polarization statistics

Midwest Magnetic Fields Workshop 2024, Madison, Wisconsin, USA (online) **08.06.2024**
Diagnostics of magnetohydrodynamic modes in the ISM through synchrotron polarization statistics

Midwest Magnetic Fields Workshop 2023, Madison, Wisconsin, USA (online) **26.05.2023**
Davis Chandrasekhar Fermi method using Ground State Alignment

IMAGINE Consortium meet 2023, Stockholm, Sweden **06.04.2023**
DCF method using atomic polarization from Ground-state Alignment

Astroparticle School 2022, Obertrubach-Bärnfels, Germany **07.10.2022**
Davis-Chandrasekhar-Fermi method employed with Ground-state Alignment

List of References

Prof. Dr. Huirong Yan

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