Johannes Philipp Bahrenberg

02.11.2026

E-mail: bahrenberg@mpia.de
Königstuhl 17, 69117 Heidelberg, Germany

Curriculum Vitae

Education

PhD in Astronomy **2025 - present**
Max Planck Institute for Astronomy & Heidelberg University **Heidelberg**
- Thesis Title: Growth of super-earths in the inner disk using global 3D hydrodynamical models
- Thesis Supervisor: Dr. Mario Flock

M.Sc. in Physics **2022 - 2025**
Heidelberg University **Heidelberg**
- Thesis Title: Probing the inner rim of protoplanetary disks: Magentohydrodynamic simulations with an analytical temperature profile
- Thesis Supervisor: Dr. Mario Flock

B.Sc. in Physics **2018 - 2022**
Heidelberg University **Heidelberg**
- Thesis Title: Radiative transfer in warped protoplanetary disks
- Thesis Supervisor: Prof. Dr. Cornelis Dullemond

Research Experience

PhD Thesis **2024 - 2025**
Max Planck Institute for Astronomy, RAPTOR Group, Dr. Mario Flock **Heidelberg**
- Implementation of non-ideal MHD into inner protoplanetary disk simulations.
- Development of ionization computation in parallel CPU mode for realistic resistivities.
- Analysis and parameter study of magneto-thermal winds, accretion and magnetic flux transport.

Master's thesis **2024 - 2025**
Max Planck Institute for Astronomy, UFOS Group, Dr. Mario Flock **Heidelberg**
- Developed stable magneto-hydrodynamic simulations of protoplanetary disks from the ground up with PLUTO.
- Coded and analytical temperature profile and simulated the inner rim evolution.

Internship **2024**
German Aerospace Center (DLR), PLATO Mission, ESA, Institute of Planetary Research, Dr. Nicola Tosi **Berlin**
- Exoplanet characterization across the mass-radius space using machine learning (Baumeister, P., **Bahrenberg, J.**, Tosi, N., Charly, A. - European Geosciences Union, GA 2025).
- Developed and implemented a novel isothermal-adiabatic atmosphere model for efficient improvement of training data quality to improve predictions for exoplanet interior structures.

Bachelor's thesis **2021 - 2022**
Institute of Theoretical Astrophysics, Planet formation group, Prof. Dr. Cornelis Dullemond **Heidelberg**
- Created synthetic observations of warped protoplanetary disks with radiative transfer simulations.
- Combined hydrodynamic disk evolution with radiative transfer to visualize warped disk evolution.
- Developed Python methods for data transfer between the 1D hydrodynamics code Dwarpy and the radiative transfer code RADMC-3D.

Publications

A magnetic activation threshold for winds in the inner protoplanetary disk
Global MHD simulations with a radiative-transfer-derived temperature profile
(**Bahrenberg, J**., Flock, M., Mattia, G., Tzouvanou, A., in prep.)

Structure formation in magnetised protoplanetary discs
A state-of-the-art observationally supported disc model (Tzouvanou, A., Flock, M., Mattia, G., **Bahrenberg, J.**, subm.)

Dwarpy: a one-dimensional evolution code for warped astrophysical disks
(Kimmig, C. N., Dullemond, C. P., **Bahrenberg, J. P.**, in prep.)

Teaching

Introduction to Astronomy **Heidelberg**
Tutorial at Department of Physics and Astronomy, Heidelberg University. **2026-2027**

CCD Photometry in modern Astronomy **Heidelberg**
Advanced Physics Lab Course at MPIA. Operating a 70 cm Telescope, CCD characterization and analysis of photometric data. **2026**

Physics A - Classical Mechanics **Heidelberg**
Tutorial at Department of Physics and Astronomy, Heidelberg University. Duties include holding weekly tutorial sessions, marking exercise sheets and and managing exams. **2024 - 2025**

Fourier Optics **Heidelberg**
Physics Lab Course at Department of Physics and Astronomy, Heidelberg University. Teaching Fourier optics experiment operation, programming sound wave simulations. **2023 - 2024**

Volunteer Activities and Outreach

Patzer Student Representative **Heidelberg**
Assistance for financial support to astronomy students through the Scientific Ernst-Patzer-Foundation. **2026 - present**

Student Assistant **Heidelberg**
Dean's Office, Department of Physics and Astronomy. Responsible for internet presence of the faculty, created website video material with professors and group leaders. **2021**

Supervisor **Heidelberg**
Department of Physics and Astronomy, Heidelberg University. Buddy Program: Supervision and support of undergraduate students during their first semesters. **2021**

Guide **Frankfurt a. M.**
Physikalischer Verein. Supervised daytime observations using solar telescopes in public parks. **2018**

Activities

Conferences
- PLUTO/OpenGadget3 Symposium (Heidelberg, Germany, 06/2026)
- Protoplanetary Disk Workshop (Vienna, Austria, 12/2025)
- Planet Formation and Evolution Workshop (Göttingen, Germany, 12/2024)
- PLUTO Symposium (Torino, Italy, 09/2024)
- Exploring the diversity of exoplanets, SPP 1992 (Berlin, Germany, 03/2024)
- Emergence of Galaxies and their Supermassive Black Holes. Financially supported by the WE-Heraeus Foundation (Berlin, Germany, 11/2022)
- Formation and Evolution of Planetary Systems Conference (Tübingen, Germany, 08/2022)

Additional Talks
- ITA, Planet Formation Group Seminar: Isothermal-convective atmosphere models and their effect on exoplanetary interiors (07/2024).
- MPIA, Planet and Star Formation Department Meeting: Isothermal-convective atmosphere models and their effect on exoplanetary interiors (06/2024).
- DLR, Planetary Physics- and Extrasolar Planets & Atmospheres Department: Isothermal-convective atmosphere models and their effect on exoplanetary interiors (05/2024).
- MPIA, Theory Group Meeting: Radiative transfer in warped protoplanetary disks (01/2024).