Curriculum Vitae

Sebastian Hutschenreuter

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Career and Education

since 2023 **Postdoctoral Researcher**,
Department for Astrophysics/University of Vienna, Austria
Supervisor: Prof. Dr. João Alves

2020 - 2023 **Postdoctoral Researcher**,
Department for Astrophysics/IMAPP/Radboud Universiteit, Netherlands
Supervisor: Prof. Dr. Marijke Haverkorn

2017–2020 **PhD in Astrophysics**,
Max Planck Institute for Astrophysics/Ludwig Maximilians Universität, Germany
Thesis topic: Magnetic Fields in our Local Universe
Doctoral Advisor: PD Dr. Torsten Enßlin

2014–2017 **M.Sc. in Physics**,
Ludwig Maximilians Universität, Germany
Thesis topic: The primordial magnetic field in our cosmic backyard
Thesis Advisor: PD Dr. Torsten Enßlin

2010–2014 **B.Sc. in Physics**,
Ludwig Maximilians Universität, Germany
Thesis topic: Chemical phases of the ISM in a stratified magnetised box
Thesis Advisor: Dr. Philipp Girichidis

Research Interests

- **The Galactic velocity field** *(active)*
  Gas flow is a fundamental physical property of the ISM. Knowing it is to know the past and future path of the gas in the Galaxy, measure momentum, and infer the external forces acting on the star-forming gas. As a part of the ISM flow project, I am working on 3D reconstruction of the gas and velocity field in the local ISM.
- **Magnetic field reconstructions** *(active)*
  Galactic magnetic fields are traced by various physical processes such as synchrotron radiation, dust polarization or Faraday rotation. My goal is to help to provide a three dimensional reconstruction of the Galactic magnetic field using these data sources.
- **The Galactic Faraday sky** *(active)*
  The Faraday effect is an important tracer for magnetic fields and the thermal electron density in the Milky Way. I am currently working on refining our knowledge on the Galactic Faraday depth sky by including new data sets and taking advantage of correlations with other observables.
- **Primordial magnetic fields:**
  Large parts of the observable Universe are filled with magnetic fields of diverse strength and morphology. I gave an prediction on a lower bound for the magnetic field strength in cosmic voids and for the morphology of the magnetic field in our cosmic neighborhood.

Press releases and popular media

- **Galactic Faraday Sky:**
  ⋆ `Faraday rotation in the Milky Way.` (*Blog Post, In the Dark*)

  - ⋆ Inner view of the Milky Way's magnetic field shows spiral structure. (*MPA Research Highlight March 2022*)
- **Primordial magnetic fields:**
  - ⋆ The primordial magnetic field in our cosmic backyard. (*MPA Research Highlight April 2018*)
  - ⋆ Relics of the Big Bang. (*MPG Research Highlight April 2018*)
  - ⋆ Astrophysicists calculate the original magnetic field in our cosmic neighbourhood. (*phys.org*)

Refereeing

- **Astronomy and Astrophysics (A&A):** 2020 - present
- **AAS Journals:** 2021 - present

Participation in Collaborations and Organisations

- **IAU:** Junior member (Link)
- **LOFAR Magnetism Key Science Project (MKSP):** Scientific member (Link)
- **Polarisation Sky Survey of the Universe's Magnetism (POSSUM):** Scientific member (Link)
- **IMAGINE consortium:** Leader of the technical working group (Link)

Technical and Professional Skills

- **Programming languages:** Proficient in Python. Working knowledge of C++.
- **Methods:** Bayesian analysis, Variational Inference, Machine Learning, Nested Sampling
- **Data science:** Development of robust likelihoods for contaminated datasets, Information Field Theory
- **Other tools:** Version control (Git), LaTeX, HTML
- **Operating Systems:** Linux (Ubuntu) and Windows.

Conferences and Workshops

- **Invited Talks**
  - ⋆ **2024 Manchester:** University of Manchester, Colloquium
    Talk: "The Faraday sky and its connection to the Galactic magnetic field".
  - ⋆ **2023 Dwingeloo:** ASTRON, Colloquium
    Talk: "The Faraday sky and its connection to the Galactic magnetic field".
  - ⋆ **2021 Cagliari (Online):** Astronomical Observatory of Cagliari, Colloquium
    Talk: "The Faraday sky and its connection to the Galactic magnetic field".
  - ⋆ **2019 Lyon:** EWASS, Conference (Invited Talk), University of Lyon
    Talk: "The Galactic Faraday depth sky revisited".
- **Selected talks**
  - ⋆ **2025 Paris:** Interstellar Institute 7, Contributed Talk
    Talk: "A 3D dust polarization map of the solar neighborhood".
  - ⋆ **2025 Cork:** EAS, Contributed Talk
    Talk: "The velocity field of Scorpius-Centaurus OB association".
  - ⋆ **2025 Cork:** EAS, Contributed Talk
    Talk: "A 3D dust polarization map of the solar neighborhood".
  - ⋆ **2023 Bochum:** CRPropa Developer Meeting, Ruhr University Bochum
    Talk: "The IMAGINE Model Library".
  - ⋆ **2023 Stockholm:** IMAGINE Collaboration, Conference, Nordita
    Talk: "Disentangling the Galactic Faraday sky".
  - ⋆ **2022 Paris:** Cosmaglow, Workshop, École Normale Supérieure

Talk: "Disentangling the Galactic Faraday sky".
- ⋆ **2021 Leiden:** IMAGINE Collaboration, Conference, Lorenz Center
  Talk: "The Galactic Faraday sky 2020".
- ⋆ **2021 (Online):** Royal Astronomical Society Specialist Discussion Meeting
  Talk: "The Galactic Faraday sky" (Youtube)
- ⋆ **2020 (Online):** IMAGINE Collaboration, Workshop
  Talk: "The Galactic Faraday sky 2020".
- ⋆ **2019 Nijmegen:** IMAGINE Collaboration, Workshop, Radboud University
  Talk: "The Galactic Faraday depth sky revisited".
- ⋆ **2018 Garching:** Institute seminar, Max Planck Institute for Astrophysics
  Talk: "The primordial magnetic field in our cosmic backyard".
- ⋆ **2018 Garching:** The High Energy Universe, Conference, Excellence Cluster Universe
  Talk: "The primordial magnetic field in our cosmic backyard".
- ⋆ **2017 Pune:** Plasma Universe and its structure formation, Conference, IUCAA (The Inter-University Centre for Astronomy and Astrophysics)
  Talk: "The primordial magnetic field in our cosmic backyard".
- ⋆ **2016 Berlin:** DFG Workshop, Harnack Haus
  Talk: "The primordial magnetic field in our cosmic backyard".

Teaching

- 2021/22 Supervision of a Master student on *Inferring The Galactic Magnetic Field with HII clouds*
- 2020 Supervision of two Master students on *Detecting Bioluminescence trough Neutrino Telescopes*
- 2019 Preparation of exercise sheets for Information Field Theory lectures.
- 2017-2018 Supervision of high school students at Max Planck Institute for Astrophysics.

Publication list

(Citation numbers as of 1/29/2026 according to NASA ADS/Google Scholar are quoted in red/turquoise. In total, the accepted publications have 485/556 citations, 280/305 of which can be attributed to the main author papers.)

- **Main author**
  - ⋆ "The velocity field of the Scorpius-Centaurus OB association",
    S. Hutschenreuter et al. (*Astronomy and Astrophysics* / arXiv:2509.13607) (1)/(0)
  - ⋆ "Disentangling the Galactic Faraday sky",
    S. Hutschenreuter et al. (*Astronomy and Astrophysics* / arXiv:2304.12350) (29)/(23)
  - ⋆ "The Galactic Faraday sky 2020",
    S. Hutschenreuter et al. (*Astronomy and Astrophysics* / arXiv:2102.01709) (157)/(173)
  - ⋆ "The Galactic Faraday depth sky revisited",
    S. Hutschenreuter, T. Enßlin (*Astronomy and Astrophysics* / arXiv:1903.06735) (62)/(73)
  - ⋆ "The primordial magnetic field in our cosmic backyard",
    S. Hutschenreuter, S.Dorn, J. Jasche, F. Vazza, D. Paoletti, G. Lavaux, T. Enßlin (*Classical and Quantum Gravity* / arXiv:1803.02629) (31)/(36)
- **Contributing author**
  - ⋆ "The evolution of velocity dispersion in the Sco-Cen OB association",
    J. Grossschedl, ..., **S. Hutschenreuter**, et al. (submitted to Astronomy and Astrophysics / arXiv:2509.19487) (3)/(0)
  - ⋆ "Direct measurement of ISM proper motion with image registration",

M. Piecka, ..., **S. Hutschenreuter**, et al. (Astronomy and Astrophysics / arXiv:2509.04857) (0)/(2)

⋆ "Modeling Local Bubble analogs-II. Synthetic Faraday rotation maps ",
E. Maconi, ..., **S. Hutschenreuter** (Astronomy and Astrophysics / arXiv:2504.09701) (1)/(1)

⋆ "The Polarisation Sky Survey of the Universe's Magnetism (POSSUM): Science Goals and Survey Description",
B. Gaensler..., **S. Hutschenreuter**, et al. (Publications of the Astronomical Society of Australia / arXiv:2505.08272) (15)/(9)

⋆ "Towards a complete picture of the Sco-Cen outflow ",
M. Piecka, **S. Hutschenreuter**, J. Alves (/ arXiv:2407.13226) (10)/(12)

⋆ "Interpolation techniques for reconstructing Galactic Faraday rotation ",
A. Khadir, ..., **S. Hutschenreuter**, et al. (/ arXiv:xxxx.xxxxx) (x)/(x)

⋆ "Improved Constraints on the Faraday Rotation toward Eight Fast Radio Bursts Using Dense Grids of Polarized Radio Galaxies ",
A. Pandhi, ..., **S. Hutschenreuter**, et al. (The Astrophysical Journal / arXiv:2502.12263) (3)/(5)

⋆ "Survey of profile parameters of the 6196 Å diffuse interstellar band-From uniform profiles to Doppler splitting and blueshifts",
M. Piecka, **S. Hutschenreuter**, J. Alves (/ arXiv:xxxx.xxxxx) (0)/(0)

⋆ "RMTable2023 and PolSpectra2023: Standards for Reporting Polarization and Faraday Rotation Measurements of Radio Sources ",
C. Van Eck, B. M. Gaensler, **S. Hutschenreuter**, et al. (AAS / arXiv:2305.16607) (9)/(7)

⋆ "Detection of magnetic fields in the circumgalactic medium of nearby galaxies using Faraday rotation ",
Heesen V., ..., **S. Hutschenreuter**, et al. (A&A / arXiv:2302.06617) (21)/(27)

⋆ "Studying Bioluminescence Flashes with the ANTARES Deep Sea Neutrino Telescope",
N. Reeb, **S. Hutschenreuter**, P. Zehetner, T. Ensslin, and the ANTARES Collaboration (Limnology and Oceanography/ arXiv:2107.08063) (1)/(5)

⋆ "A method for reconstructing the Galactic magnetic field using dispersion of fast radio bursts and Faraday rotation of radio galaxies",
A. Pandhi, **S. Hutschenreuter**, J. L. West, B. M. Gaensler, and A. Stock (MNRAS / arXiv:2208.06417) (5)/(5)

⋆ "NIFTy5: Numerical Information Field Theory",
P. Arras; M. Baltac; T.A. Ensslin, P. Frank **S. Hutschenreuter** (Astrophysics Source Code Library, ascl:1903.008) (18)/(25)

⋆ "Determining the composition of radio plasma via circular polarization: the prospects of the Cygnus A hot spots",
T. Enßlin, **S. Hutschenreuter**, G. Krishna (*JCAP*/arXiv:1808.07061) (2)/(2)

⋆ "NIFTy 3 - Numerical Information Field Theory - A Python framework for multicomponent signal inference on HPC clusters",
T. Steininger, J. Dixit, P. Frank, M. Greiner, **S. Hutschenreuter**, J. Knollmüller, R. Leike, N. Porqueres, D. Pumpe, M. Reinecke, M. Sraml, C. Varady, T. Enßlin (*Annalen der Physik* / (arXiv:1708.01073) (27)/(31)

⋆ "The Galaxy in circular polarization: all-sky radio prediction, detection strategy, and the charge of the leptonic cosmic rays",
T. Enßlin, **S. Hutschenreuter**, V. Vacca, N. Oppermann (*Physical Review D* / arXiv:1706.08539) (11)/(11)