Curriculum Vitae

Sebastian Hutschenreuter

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Career and Education

since 2020 **PostDoc**,
Department for Astrophysics/IMAPP/Radboud Universiteit, Netherlands.
Advisor: 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

- **Magnetic field reconstructions** *(active)*
  Galactic magnetic fields are traced by various physical processes such as synchrotron radiation, dust polarization pr Faraday rotation. My goal is it to help in providing 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

- **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*)
- **Galactic Faraday Sky:**
  - ⋆ Inner view of the Milky Way's magnetic field shows spiral structure. (*MPA Research Highlight March 2022*)

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 repositories (Git, SVN), LaTeX
- **Operating Systems:** Linux (Ubuntu) and Windows.

List of Publications

- "The Galactic Faraday sky 2020",
  S. Hutschenreuter, T. Enßlin (*Astronomy and Astrophysics* / arXiv:1903.06735)
- "The Galactic Faraday depth sky revisited",
  S. Hutschenreuter, T. Enßlin (*Astronomy and Astrophysics* / arXiv:1903.06735)
- "NIFTy5: Numerical Information Field Theory",
  P. Arras; M. Baltac; T.A. Ensslin, P. Frank **S. Hutschenreuter**, J. Knollmueller, R. Leike, M. Newrzella, L. Platz, M. Reinecke, J.Stadler (Published in the *Astrophysics Source Code Library*)
  (ascl:1903.008)
- "Determining the composition of radio plasma via circular polarization: the prospects of the Cygnus A hot spots",
  T. Enßlin , **S. Hutschenreuter**, (Published in *Journal for Cosmology and Astroparticle Research*)
  Link to Publisher: https://iopscience.iop.org/article/10.1088/1475-7516/2019/01/035/meta
  (arXiv:1808.07061)
- "The primordial magnetic field in our cosmic backyard",
  S. Hutschenreuter, S.Dorn, J. Jasche, F. Vazza, D. Paoletti, G. Lavaux, T. Enßlin (Published in *Classical and Quantum Gravity*)
  Link to Publisher: https://iopscience.iop.org/article/10.1088/1361-6382/aacde0
  (arXiv:1803.02629)
- "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 (Published in *Annalen der Physik*)
  (arXiv:1708.01073)
- "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 (Published in *Physical Review D*)
  Link to Publisher: https://journals.aps.org/prd/abstract/10.1103/PhysRevD.96.043021
  (arXiv:1706.08539)

Conferences and Workshops

- **2020:** IMAGINE Collaboration, Workshop, Online
  Talk: "The Galactic Faraday sky 2020".
- **2019 Lyon:** EWASS, Conference, University of Lyon
  Talk: "The Galactic Faraday depth sky revisited".
- **2019 Nijmegen:** IMAGINE Collaboration, Workshop, Radboud University
  Talk: "The Galactic Faraday depth sky revisited".
- **2019 Aachen:** Big Data Science in Astroparticle Research, Workshop, RWTH
  Supervision of NIFTy Tutorial
- **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 Mumbai:** CEBS (Centre for Exellence in Basic Sciences)
  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.