

# 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 or 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),  $\text{\LaTeX}$
- **Operating Systems:** Linux (Ubuntu) and Windows.

## List of selected Publications

- “Studying Bioluminescence Flashes with the ANTARES Deep Sea Neutrino Telescope”, N. Reeb, **S. Hutschenreuter**, P. Zehetner, T. Ensslin, and the ANTARES Collaboration ([arXiv:2107.08063](#) )
- “The Galactic Faraday sky 2020”, **S. Hutschenreuter** et al. ([Astronomy and Astrophysics](#) / [arXiv:2102.01709](#) )
- “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** ([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**, ( [Journal for Cosmology and Astroparticle Research](#) / [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 ([Classical and Quantum Gravity](#) / [arXiv:1803.02629](#))
- “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](#))

## Conferences and Workshops

- **2021:** Astronomical Observatory of Cagliari, Colloquium, Online  
Talk: “The Faraday sky and its connection to the Galactic magnetic field”.
- **2021:** IMAGINE Collaboration, Conference, Leiden  
Talk: “The Galactic Faraday sky 2020”.
- **2021:** MKSP Milky Way working group, Meeting, Online  
Talk: “The Galactic Faraday sky 2020”.
- **2020:** IMAGINE Collaboration, Workshop, Online  
Talk: “The Galactic Faraday sky 2020”.
- **2019 Lyon:** EWASS, Conference (Invited Talk), 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 Excellence 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.