

Education

- April 2020 - **Ph.D. candidate in Astrophysics**, *Ludwig-Maximilians-Universität München*, Germany.
present Advisors: Dr. Stella Seitz, Prof. Ralf Bender
Thesis: *The integrated 3-point correlation functions of weak lensing and galaxy density fields*.
Expected graduation: Feb 2024
- Oct 2017 - **M.Sc. Astrophysics**, *Ludwig-Maximilians-Universität München*, Germany.
- March 2020 Advisors: Dr. Stella Seitz, Dr. Oliver Friedrich
Thesis: *Position-dependent 2-point correlation function of lognormal random fields*.
- Sep 2014 - **B.Sc. Physics**, *Jacobs University Bremen*, Germany.
- June 2017 Advisors: Prof. Joachim Vogt, Prof. Peter Schupp
Thesis: *Multi-Scale Analysis of Auroral Currents Measured by the Swarm Satellite Mission*.

Academic employment

Ludwig-Maximilians-Universität München, Germany

- Jan 2019 - **Teaching and Research Assistant**.
present Advisor: Dr. Stella Seitz
- Conducting research projects in weak lensing cosmology.
 - Supervision of student research projects, tutor for B.Sc. Physics, M.Sc. Astrophysics labs and courses.
 - USM Extragalactic Astronomy research group seminar organiser and website developer.

Heinz Maier-Leibnitz Research Centre, Munich, Germany

- Nov 2017 - **Research Assistant**, Scientific Computing group.
- Dec 2018 Advisor: Dr. Joachim Wuttke
- Development of an open-source software [BornAgain](#) - used for simulating and fitting small-angle x-ray scattering.

Jacobs University Bremen, Germany

- Sep 2015 - **Teaching and Research Assistant**.
- Sep 2017 Advisors: Prof. Jürgen Fritz, Prof. Angelo Pio-Rossi
- Tutor for B.Sc. Physics courses.
 - Development of an open-source interface for visualisation and analysis of Mars Reconnaissance Orbiter data for the [PlanetServer](#) project. Poster: *PlanetServer Python API - Visualization and Analysis of CRISM images*, 48th Lunar and Planetary Science Conference - USRA-Houston 2017, USA.

Instituto de Astrofisica de Canarias, Tenerife, Spain

- June 2017 - **Internship**, [DAAD RISE Weltweit Scholar 2017](#).
- Aug 2017 Advisor: Dr. Jairo Abreu-Mendez
- Quantifying the demographics of Boxy/Peanut structures in edge-on galaxies in the local Universe.

University of St Andrews, United Kingdom

- June 2016 - **Internship**, [DAAD RISE Weltweit Scholar 2016](#).
- Aug 2016 Advisor: Prof. Christine Greif
- Analysis and validation of realistic synthetic observations of star forming clouds.

Fraunhofer Institute for Laser Technology, Aachen, Germany

- July 2015 - **Internship**, Department of Lasers and Optics.
- Aug 2015 Advisor: Dr. Tobias Bonhoff
- Model validation of thermal surface deformation of optical lenses due to laser beams.

Grants and Awards

- 2019 - present Successful high-performance computing grant proposals as project PI at the [C2PAP](#) super-computing facility of the Excellence Cluster ORIGINS, Munich (overall > 9.5 million CPU hours granted along with access to GPUs).
- Dec 2022 Awarded travel grant for Early Career Scientists from the [Dark Energy Survey \(DES\)](#) collaboration to attend collaboration wide meeting.
- March 2022 Successful grant proposal for supporting an international undergraduate student to complete a summer internship at LMU Munich under the [DAAD RISE Germany](#) scholarship scheme.
- Nov 2020 Ranked in the top 10% of Ludwig-Maximilians-Universität München's graduating class of 2020 in recognition of the academic performance during the course of Master's study.
- June 2017 Placed on the President's List of Jacobs University Bremen in recognition of the academic performance during the course of Bachelor's study.
- 2016, 2017 Awarded the [DAAD RISE Weltweit Scholarships](#) in 2016 and 2017 (two consecutive years) for conducting research projects in astronomy in institutions outside Germany.
- 2014 - 2017 Awarded Merit-based Scholarship for undergraduate studies at Jacobs University Bremen, Germany.
- June 2014 Ranked in the Merit List (top 1%) of the country and qualified for Scholarship for Higher Education (INSPIRE) by virtue of performance in the All India Senior Secondary high-school graduation examinations 2014, India (*qualified and declined*).

Talks

Given more than 15 talks at conferences, seminars, colloquia and collaboration meetings (in-person and remote).

[Selected Talks](#) (outside Munich area)

- April 2023 *The Integrated 3-point correlation function of projected cosmic density fields*, **Future Cosmology summer school, Cargese, France**.
- Feb 2023 *The Integrated 3-point correlation function of cosmic shear*, **Astromerique Speaker Series, University of Montreal, Canada** (*remotely*).
- Jan 2023 *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, **Cosmo-Exgal seminar, University College London, UK**.
- Jan 2023 *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, **Special Session on New Results from the Dark Energy Survey, 241st American Astronomical Society Meeting, Seattle, USA**.
- May 2022 *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, **German Centre for Cosmological Lensing, Ruhr University Bochum, Germany** (*remotely*).
- April 2022 *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, **Cosmology with Weak Lensing: beyond the 2-point statistics, Yukawa Institute for Theoretical Physics, Kyoto University, Japan** (*remotely*).
- Feb 2022 *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, **Institute for Advanced Study, Princeton, New Jersey, USA** (*remotely*).
- Sep 2019 *Position-dependent 2-point correlation function of lognormal random fields*, **Workshop on Non-Gaussian Universe, University of Cambridge, UK**.

Teaching experience

- Oct 2019 - present Tutor and grader at LMU Munich for B.Sc. Physics and M.Sc. Astrophysics labs. Designed and introduced the *Weak Gravitational Lensing* M.Sc. Astrophysics lab.
- April - Aug 2023 Tutor at LMU Munich for the M.Sc. Astrophysics course *Formation and Evolution of Cosmic Structures* by Dr. Ariel Sanchez.
- Sep 2015 - June 2017 Tutor and grader at Jacobs University Bremen for B.Sc. Physics courses: *Classical Physics*, *Modern Physics*, *Statistical Physics*, *Renewable Energy*.

Mentoring experience

- April 2023 - present **David Gebauer** (currently M.Sc. student at LMU Munich), master's thesis: *Probing higher-order lensing statistics with simulation-based inference*.
- June 2022 - Aug 2022 **Yue Pan** (currently graduate student at Princeton University), [DAAD RISE Germany](#) undergraduate intern at LMU Munich. Project: *MOPED data compression on lensing two-point correlation function*.
- April 2020 - present **Zhengyangguang Gong** (currently Ph.D. candidate at LMU Munich), master's thesis and co-supervision of Ph.D. project. Master's project: *Constraining Neutrino Masses with Weak Lensing Convergence 2-point Correlation Function*.

Skills

Languages Bengali (native), English (bilingual), German (intermediate), Hindi (basic).

Programming c, c++, python, bash, High-performance computing

Academic references

Prof. Ralf Bender, LMU Munich, Email: bender@mpe.mpg.de

Dr. Oliver Friedrich, LMU Munich, Email: Oliver.Friedrich@physik.uni-muenchen.de

Prof. Daniel Gruen, LMU Munich, Email: daniel.gruen@lmu.de

Prof. Eiichiro Komatsu, MPA Munich, Email: komatsu@MPA-Garching.MPG.DE

Dr. Ariel Sanchez, MPE Munich, Email: arielsan@mpe.mpg.de

Dr. Stella Seitz, LMU Munich, Email: stella@usm.lmu.de

Publications

7 refereed articles (including preprints currently in review):

3 first-author, 3 second-author (major contributions) and 1 minor contribution as final-author.

A. Barthelemy, A. **Halder**, Z. Gong, and C. Uhlemann, "Making the leap I: Modelling the reconstructed lensing convergence PDF from cosmic shear with survey masks and systematics," *J. Cosmology Astropart. Phys.*(*submitted*) (July, 2023) , [arXiv:2307.09468](#).

A. **Halder**, Z. Gong, A. Barreira, O. Friedrich, S. Seitz, and D. Gruen, "Beyond 3×2 -point cosmology: the integrated shear and galaxy 3-point correlation functions," *J. Cosmology Astropart. Phys.*(*accepted; in press*) (Sept., 2023) , [arXiv:2305.17132](#).

Z. Gong, A. **Halder**, A. Barreira, S. Seitz, and O. Friedrich, "Cosmology from the integrated shear 3-point correlation function: simulated likelihood analyses with machine-learning emulators," *J. Cosmology Astropart. Phys.* **2023** no. 7, (July, 2023) 040, [arXiv:2304.01187](#).

A. **Halder** and A. Barreira, "Response approach to the integrated shear 3-point correlation function: the impact of baryonic effects on small scales," *MNRAS* **515** no. 3, (Sept., 2022) 4639–4654, [arXiv:2201.05607](#).

O. Friedrich, A. **Halder**, A. Boyle, C. Uhlemann, D. Britt, S. Codis, D. Gruen, and C. Hahn, "The PDF perspective on the tracer-matter connection: Lagrangian bias and non-Poissonian shot noise," *MNRAS* **510** no. 4, (Mar., 2022) 5069–5087, [arXiv:2107.02300](#).

A. **Halder**, O. Friedrich, S. Seitz, and T. N. Varga, "The integrated three-point correlation function of cosmic shear," *MNRAS* **506** no. 2, (Sept., 2021) 2780–2803, [arXiv:2102.10177](#).

R. Marco Figuera, B. Pham Huu, A. P. Rossi, M. Minin, J. Flahaut, and A. **Halder**, "Online characterization of planetary surfaces: PlanetServer, an open-source analysis and visualization tool," *Planet. Space Sci.* **150** (Jan., 2018) 141–156.