Anik Halder

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https://anikhalder.github.io

Education

2020–present **Doctoral student in Astrophysics**, *University Observatory (USM), Ludwig-Maximilians-Universität München*, Germany, **Advisors**: Stella Seitz, Ralf Bender.

2020 **Master of Science in Astrophysics**, *Ludwig-Maximilians-Universität München*, Germany.

Research and Work Experience

Ludwig-Maximilians-Universität München, Germany

Jan 2019–present **Research and Teaching Assistant**, University Observatory Munich USM.
Responsibilities:
- Tutor for the course *Formation and Evolution of Cosmic structures* by Dr. Ariel Sanchez (Summer semester 2023).
- Tutor for astrophysics labs.
- Reduction of data obtained from the Wide-Field Imager at Mount Wendelstein Observatory's 2-m Telescope for studying gravitational weak lensing by galaxy clusters.
- USM extragalactic astronomy working group seminar organiser and website maintainer.

2020 – present **Research project supervision**.
- **David Gebauer**, master's thesis (2023-present) : *Probing higher-order lensing statistics with simulation-based inference.*
- **Yue Pan**, DAAD RISE undergraduate scholar (summer 2022): *Massive Data Compression on Convergence Two-Point Correlation Function*.
- **Zhengyangguang Gong**, master's thesis (2020-2021): *Constraining Neutrino Masses with Weak Lensing Convergence 2-point Correlation Function*.

Forschungszentrum Jülich, Germany

Nov 2017–Dec 2018 **Student Research Assistant**.
Software developer at the Scientific Computing group in the Jülich Centre for Neutron Science outstation at Heinz Maier-Leibnitz Research Centre, Garching.
Responsibilities: Development and testing of the software BornAgain - used for simulating and fitting small-angle scattering at grazing incidence.

Instituto de Astrofisica de Canarias, Tenerife, Spain

June 2017–Aug 2017 **Internship**, *DAAD RISE Weltweit Scholar 2017*.
Quantifying the demographics of Boxy/Peanut structures in edge-on galaxies in the local Universe.

University of St Andrews, United Kingdom

June 2016–Aug 2016 **Internship**, *DAAD RISE Weltweit Scholar 2016*.
Analysis and validation of realistic synthetic observations of star forming clouds.

Fraunhofer Institute for Laser Technology, Aachen, Germany

July 2015–Aug 2015 **Internship**, Department of Lasers and Optics.
Validating models for thermal surface deformation of lenses by implementing different numerical algorithms in C++ and analysing them using Zeemax OpticStudio and MATLAB.

Awards

December 2020 — Travel grant for Early Career Scientists from the Dark Energy Survey (DES) collaboration to attend collaboration wide meeting.

March 2017 — Awarded the DAAD RISE Weltweit 2017 Scholarship (second time) for conducting a research project in astronomy at the Instituto de Astrofisica de Canarias, Spain.

March 2016 — Awarded the DAAD RISE Weltweit 2016 Scholarship for conducting a research project at the School of Physics and Astronomy, University of St Andrews, United Kingdom.

Talks and presentations

April 2023 — **Talk**, *The Integrated 3-point correlation function of projected cosmic density fields*, Future Cosmology summer school, Cargese, France.

March 2023 — **Talk**, *The Integrated 3-point correlation function of of projected cosmic density fields*, OPINAS group retreat, Ringberg, Germany.

Feb 2023 — **Virtual Talk**, *The Integrated 3-point correlation function of cosmic shear*, Astromerique Speaker Series, University of Montreal, Canada.

Jan 2023 — **Talk**, *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 — **Poster**, *The Integrated 3-point correlation function of cosmic shear*, Dark Energy Survey collaboration meeting, Univesity of Portsmouth, UK.

Jan 2023 — **Talk**, *The Integrated 3-point correlation function of projected cosmic density fields*, Department of Physics, University of Washington, Seattle, USA.

Jan 2023 — **Talk**, *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.

Nov 2022 — **Talk**, *The Integrated 3-point correlation function of projected cosmic density fields*, Dark Energy Connector-4 Science Day of the ORIGINS Cluster, Max Planck Institute for Extraterrestrial Physics, Garching, Germany.

May 2022 — **Virtual Talk**, *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, Cambridge-Munich cosmology journal club.

May 2022 — **Virtual Talk**, *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.

April 2022 — **Virtual Talk**, *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.

April 2022 — **Talk**, *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, Cosmology seminar, Max Planck Institute for Astrophysics, Garching, Germany.

Feb 2022 — **Virtual Talk**, *Response approach to the Integrated shear 3-point correlation function: impact of baryonic effects on small scales*, Coffee seminar, Institute for Advanced Study, Princeton, New Jersey, USA.

July 2021 — **Virtual Talk**, *The Integrated 3-point correlation function of cosmic shear*, Density Split Statistics seminar, Stanford University, USA.

July 2021 — **Virtual Talk**, *The Integrated 3-point correlation function of cosmic shear*, OPINAS seminar Max Planck Institute for Extraterrestrial Physics, Garching, Germany.

Sep 2019 **Talk**, *Position-dependent 2-point correlation function on lognormal density fields*, Workshop on Non-Gaussian Universe, University of Cambridge, UK.

Publications

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," *arXiv e-prints* (July, 2023) arXiv:2307.09468, arXiv:2307.09468 [astro-ph.CO].

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," *arXiv e-prints* (May, 2023) arXiv:2305.17132, arXiv:2305.17132 [astro-ph.CO].

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.

A. **Halder** and A. Barreira, "Response approach to the integrated shear 3-point correlation function: the impact of baryonic effects on small scales," *Monthly Notices of the Royal Astronomical Society* (July, 2022) .

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," *Monthly Notices of the Royal Astronomical Society* **510** no. 4, (January, 2022) 5069–5087.

A. **Halder**, O. Friedrich, S. Seitz, and T. N. Varga, "The integrated 3-point correlation function of cosmic shear," *MNRAS* (June, 2021) .

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.

References

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

Dr. Alexandre Barreira, LMU Munich, Email: alex.barreira@origins-cluster.de

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

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

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

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

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