

Maximilian von Wietersheim-Kramsta

Ogden Centre for Fundament Physics – West, Department of Physics,
Durham University, South Road, Durham DH1 3LE

Email: maximilian.von-wietersheim-kramsta@durham.ac.uk – Web: <https://mwiet.github.io>

RESEARCH

- Apr. 2024 –present **Postdoctoral Research Associate, Institute for Computational Cosmology & Centre for Extragalactic Astronomy, Durham University (UK)**
Large scale structure, dark matter, dark energy, cosmological inference, simulation-based inference, strong and weak gravitational lensing observations, charge transfer inefficiency in space telescopes. Active member of Euclid (SWG Weak Lensing and VIS), Kilo-Degree Survey, COSMOS-Web and Habitable Worlds Observatory.
- Jun. 2023 **Postdoctoral Research Fellow, Cosmoparticle Initiative, Astrophysics Group, University College London (UK)**
-Apr. 2024 Development of forward models for large-scale structure measurements by the Euclid Space Telescope (SGS LE3), and the Kilo-Degree Survey.
- Jun.-Aug. 2018 **Research Intern, ICIC, Astrophysics Group, Department of Physics, Imperial College London (UK)**
Development of a novel Bayesian method together with to analyse spectra of gamma rays detected by the Fermi LAT.
Advisers: Dr Alex Geringer-Sameth, Prof. Roberto Trotta
- Jun.-Aug. 2017 **Research Intern, ICIC, Astrophysics Group, Department of Physics, Imperial College London (UK)**
Development of an outreach map containing the location in space of most objects ever discovered from the low Earth orbit to the edge of the observable.
Adviser: Prof. Roberto Trotta
- Jul. 2015 **Research Intern, Instituto de Astrofísica de las Canarias, IAC (Spain)**
Observation nights on the Teide (Tenerife) with the IAC-80 telescope.
Advisers: Dr Miquel Serra-Ricart, Juan Carlos Casado
- Jul. 2014 **Research Intern, Centro de Astrofísica da Universidade do Porto, CAUP (Portugal)**
Computational analysis of supernovae and Hubble parameter data.
Adviser: Dr Carlos Martins

EDUCATION AND QUALIFICATIONS

- 2019-May 2023 **PhD in Physics and Astronomy, University College London (UK)**
Thesis: *'Forward-Simulations of Large-Scale Structure for Cosmological Inference'* - Development of realistic simulations of large-scale structure to inform the simulation-based inference (SBI) of cosmological parameters from the data of the Kilo-Degree Survey.
Adviser: Prof Benjamin Joachimi
- 2015-2019 **MSci Physics (4-year course), Imperial College London (UK)**
Specialisation: Cosmology, General Relativity, Information Theory, Quantum Field Theory and the Standard Model
Thesis: *'A Bayesian Approach to the Inference of the Stellar Mass of Galaxies from Large Photometric Surveys'* - Analysis of the COSMOS2015 catalogue using spectral energy distribution fitting to determine the galaxies stellar mass function and constrain cosmology.
Adviser: Prof Roberto Trotta
- 2009-2015 **Institut Manuel Sales i Ferré, Ulldecona (Spain)**
Título de Bachillerato with honours (secondary education for entry into higher education) and Educació Secundària Obligatòria, ESO (obligatory secondary education).

AWARDS AND GRANTS

2019-2023	STFC PhD Studentship - UK Research and Innovation
2019	Prize for best research proposal presentation - Imperial College London
2015	Título de Bachillerato with honours - Institut Manuel Sales i Ferré
2013-2015	Youth Science Program - Catalunya-LaPedrera Foundation Scholarship that funds courses and research in astronomy.
2013-2014	Becas Estudia en Canadá - <i>Amancio Ortega Foundation</i> Scholarship that finances an academic year (2013-14) in a Canadian high school. Grade 11 was completed at the Reynolds Secondary School in Victoria, British Columbia.

TALKS AND SEMINARS

10/07/2024	- Conference talk on KiDS-SBI	<i>CosmoVerse, Jagiellonian University in Krakow (Poland)</i>
27/06/2024	- (Invited) Cosmology seminar on KiDS-SBI	<i>Queen Mary University of London (UK)</i>
18/06/2024	- Conference talk on KiDS-SBI	<i>Euclid Consortium Meeting, Sapienza Università di Roma (Italy)</i>
21/05/2024	- Conference talk on KiDS-SBI	<i>COSMO21, Chania (Greece)</i>
13/05/2024	- Conference talk on KiDS-SBI	<i>UK Cosmology Meeting/Ruth Fest, King's College London (UK)</i>
15/04/2024	- Poster presentation	<i>Challenging the standard cosmological model, Royal Society (UK)</i>
10/04/2024	- Conference talk on LSS simulations	<i>SBI for galaxy evolution, University of Bristol (UK)</i>
27/03/2024	- (Invited) Talk on KiDS-SBI cosmic shear	<i>University of Edinburgh (UK)</i>
12/03/2024	- (Invited) Talk on KiDS-SBI cosmic shear	<i>Imperial College London (UK)</i>
21/02/2024	- (Remote) Talk on variable depth in Euclid cosmic shear	<i>University of Innsbruck (Austria)</i>
14/12/2023	- Talk on variable depth in Euclid cosmic shear	<i>Royal Astronomical Society (UK)</i>
16/11/2023	- Seminar on simulation-based inference	<i>Durham University (UK)</i>
20/10/2023	- (Remote) Talk on the covariance of KiDS	<i>Inter-Science Taskforce: NL, Euclid consortium</i>
26/09/2023	- Seminar on KiDS-SBI at a KiDS collaboration meeting	<i>Ruhr-University Bochum (Germany)</i>
09/03/2023	- (Invited) Seminar on KiDS-SBI cosmic shear	<i>Durham University (UK)</i>
05/10/2022	- Talk on KiDS-SBI and numerical covariance at a KiDS meeting	<i>University of Hull (UK)</i>
18/05/2022	- Talk on KiDS-SBI at a KiDS collaboration meeting	<i>NCNR/NCBJ, Warsaw (Poland)</i>
22/04/2022	- Conference talk on KiDS-SBI cosmic shear	<i>LFI in Paris, ENS (France)</i>
18/11/2021	- Co-chairing of discussion on KiDS variable depth	<i>University of Leiden (Netherlands)</i>
04/12/2020	- Seminar on statistical dimensionality reduction	<i>University College London (UK)</i>
23/11/2020	- (Remote) Talk on magnification bias at KiDS meeting	<i>Ruhr-Universität Bochum (Germany)</i>
11/03/2020	- (Invited) Talk on magnification bias	<i>University of Edinburgh (UK)</i>
18/12/2018	- Outreach talks on careers in STEM at a school	<i>Institut Manuel Sales i Ferré (Spain)</i>

LEADERSHIP ROLES

Apr. 2024-Now	Co-coordinator of charge-transfer inefficiency efforts in the Euclid consortium
Jun. 2023-Now	Co-lead of variable depth modelling project in the Euclid consortium
Jan. 2021-Now	Coordinator for the Kilo-Degree Survey numerical covariance efforts
Jan. 2021-Now	Coordinator of the Kilo-Degree Survey simulation-based inference team
May 2023	Co-organiser and chair of a week-long Kilo-Degree Survey's consortium meeting at the UCL Observatory
Sep. 2021 - Jun. 2022	Co-organiser of the cosmology journal club - University College London (UK) Organisation and moderation of the weekly cosmology journal club at UCL. Development and implementation of the "hybrid" format which combined remote and in-person attendance.
Jan. - Jun. 2021	Organiser of the astrophysics lunch talks - University College London (UK) Organisation and moderation of the twice-per-term talks by internal and external speakers.
Mar. 2020	Organiser of an outreach stand on dark matter - Your Universe: UCL Festival (UK) Creation of outreach posters on gravitational lensing and dark matter. Presentation of short talks to primary and secondary school students over 3 days

TEACHING EXPERIENCE

- 2015-2023 **Personal Tutor, Student Tutors Group Ltd and FirstTutors.co.uk**, London (UK)
Individual home tutoring/teaching for all students up to A-levels/IB in physics, maths, chemistry and languages. This work involved the preparation of lessons, the creation of study plans and practice material for exams, and the marking of homework.
- 2020-2021 **Postgraduate Teacher Assistant**, University College London (UK)
Tutorials for 'Maths methods' and 'Atoms, Stars and the Universe' courses (1st year UG).
- 2019-2020 **Postgraduate Teacher Assistant**, University College London (UK)
Marking for 'Physical cosmology' course (3rd year UG).

POSTGRADUATE TRAINING

- Sep. 2022 **B.U.S.S. in Theoretical Elementary Particle Physics** - Imperial College London (UK)
- Jun. 2021 **Summer School in Statistics for Astronomers (Remote)** - Penn State University (USA)
- Feb. -Jun. 2021 **PhD lecture programme: astrostatistics, ML** - University College London (UK)
- Jun. 2020 **Michigan Cosmology Summer School (Remote)** - University of Michigan (USA)
- Mar. -Apr. 2020 **Course on 'Stellar Structure and Evolution'** - University College London (UK)

ADDITIONAL SKILLS

IT skills

- Proficient in, and comprehensive understanding of Python. Experienced in C++, bash, Mathematica and LaTeX. Familiar with SQL, R and HTML.
- Use of high-throughput computing: COSMA8, UCL Hypatia, Imperial HPC and U. of Edinburgh Cuillin.
- Implementation of parallel processes through MPI, OpenMP and multiprocessing.
- Collaborative coding and version management through git:
 - Development of *KiDS-SBI*, *KCAP-NonLimber*, *MAGBET* and *5param*.
 - Contributions to *GLASS* and *nonLimber_matter_shells*.

Language skills

- Proficient in reading, writing, speaking and listening of English, German, Spanish and Catalan.

PUBLICATIONS

(citations: 202, h-index: 5 according to *NASA ads*)

von Wietersheim-Kramsta, M., Lin, K., Tessore, N., Joachimi, B., Loureiro, A., Reichke, R., Wright, A.H., (2024). KiDS-SBI: Simulation-Based Inference Analysis of KiDS-1000 Cosmic Shear. *Submitted to Astronomy & Astrophysics*.

Contributions: Main author, coordinator of the SBI efforts within the KiDS collaboration, development and testing of the full simulation pipeline.

Euclid Consortium (incl. **von Wietersheim-Kramsta, M.**) (2024). Euclid. I. Overview of the Euclid mission. *Submitted to Astronomy & Astrophysics*.

Contributions: Science Ground Segment and VIS instrument pipeline.

Tessore, N., Loureiro, A., Joachimi, B., **von Wietersheim-Kramsta, M.**, & Jeffrey, N. (2023). GLASS: Generator for Large Scale Structure. *The Open Journal of Astrophysics*, 6, 11.

Contributions: Testing of the module and implementation of intrinsic alignments.

Lin, K., **von Wietersheim-Kramsta, M.**, Joachimi, B. & Feeney, S. (2023). A simulation-based inference pipeline for cosmic shear with the Kilo-Degree Survey. *Monthly Notices of the Royal Astronomical Society*, 524(4), 6167-6180.

Contributions: Second author, development of two sets of cosmological simulations.

Fortuna, M. C., Hoekstra, H., Johnston, H., Vakili, M., Kannawadi, A., Georgiou, C., ... & **von Wietersheim-Kramsta, M.** (2021). KiDS-1000: Constraints on the intrinsic alignment of luminous red galaxies. *Astronomy & Astrophysics*, 654, A76.

Contributions: Measurement of the magnification bias in the KiDS-1000 LRG sample.

von Wietersheim-Kramsta, M., Joachimi, B., van den Busch, J. L., Heymans, C., Hildebrandt, H., Asgari, M., ... & Wright, A. H. (2021). Magnification bias in galaxy surveys with complex sample selection functions. *Monthly Notices of the Royal Astronomical Society*, 504(1), 1452-1465.

Contributions: Main author, development of the novel methodology to measure the magnification bias and application to KiDS-1000, HSC Wide and a stage-IV-like galaxy survey.

Joachimi, B., Lin, C. A., Asgari, M., Tröster, T., Heymans, C., Hildebrandt, H., ..., **von Wietersheim-Kramsta, M.**,...& Zuntz, J. (2021). KiDS-1000 methodology: Modelling and inference for joint weak gravitational lensing and spectroscopic galaxy clustering analysis. *Astronomy & Astrophysics*, 646, A129.

Contributions: Measurement of the magnification bias in the BOSS galaxy sample.

Martins, C. J. A. P., Pinho, A. M. M., Alves, R. F. C., Pino, M., Rocha, C. I. S. A., & **von Wietersheim-Kramsta, M.** (2015). Dark energy and equivalence principle constraints from astrophysical tests of the stability of the fine-structure constant. *Journal of Cosmology and Astroparticle Physics*, 2015(08), 047.

Contributions: Computational analysis of supernovae and Hubble parameter data and funding.