Maximilian von Wietersheim-Kramsta

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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, machine learning/AI, strong and weak gravitational lensing observations, charge transfer inefficiency in space telescopes, and statistical techniques for medical cancer research (*AI-VISION*). Active member of *Euclid* (SWG Weak Lensing and VIS), *Kilo-Degree Survey* (KiDS), *COSMOS-Web* and *Habitable Worlds Observatory*.

Jun. 2023 -Apr. 2024 **Postdoctoral Research Fellow - Cosmoparticle Initiative, Astrophysics Group, University College London** (UK)
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**, **Imperial College London** (UK)
Development of a novel Bayesian method together with to analyse gamma ray spectra.
Advisers: Dr Alex Geringer-Sameth, Prof. Roberto Trotta

Jun.-Aug. 2017 **Research Intern - ICIC, Astrophysics Group, Imperial College London** (UK)
Development of a map containing the location in space of known astronomical objects.
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 Astrofisica 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.
Advisers: Prof. Benjamin Joachimi, Dr Andreu Font Ribera, Dr Stephen Feeney

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 Educación Secundaria Obligatoria, ESO (obligatory secondary education).

LEADERSHIP ROLES

Apr. 2024-Now **Coordinator of the VIS charge-transfer inefficiency efforts** - Euclid consortium
Execution and reporting of CTI calibration effort within OU-VIS.

2024-Now **Kilo-Degree Survey builder status** - KiDS consortium

Jan. 2021-Now **Coordinator simulation-based inference & forward modelling team** - KiDS consortium
Execution and reporting of SBI and simulations for KiDS-1000 and Legacy.

PROFESSIONAL EXPERIENCE

Dec. 2024-Now **Co-chair of the SOC & LOC for the *ASTRODAT* workshop -** Durham University (UK)
Organisation of the *ASTRODAT* workshop on coding and astrostatistics in September 2025.

Jul. 2025-Now **Chair of the SOC of session at *National Astronomy Meeting*** - Durham University (UK)
Day-long session: *'The Golden Era of Gravitational Lensing: from Micro to Macro'.*

Oct. 2024-Now **Creator & organiser of *'Scraps of Science'* sessions** - Durham University (UK)
Fortnightly session where all members of the astronomy group discuss current research.

Oct. 2024-Now **Organiser of *'Lensing Lunch'* sessions** - Durham University (UK)
Fortnightly session to discuss and present gravitational lensing-related research.

2021-2025 **Chairing of conference talks** - National Astronomy Meeting 2025, Euclid UK Meeting 2024, Kilo-Degree Survey Meeting 2021.

2023-2025 **Journal referee** - Monthly Notices to the RAS and the Open Journal of Astrophysics

May 2023 **Organiser & chair of a conference for the KiDS consortium** - UCL Observatory (UK)
Organisation of a week-long KiDS consortium meeting and social activities.

Sep. 2021 - Jun. 2022 **Organiser of the cosmology journal club** - University College London (UK)
Weekly cosmology journal club at UCL. Development of the 'hybrid' attendance format.

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.

TEACHING EXPERIENCE

11 Mar. 2025 **Guest Lecturer** - Durham University (UK)
Contribution to lecture about gravitational lensing for the 2nd-year undergraduate course *'Star and Galaxies'*(~200 students).

2024-2025 **Workshop Demonstrator and Lead** - Durham University (UK)
Convening and demonstrating of workshops as part of the 2nd-year undergraduate course *'Theoretical Physics 2'* over two terms (36 hours with ~50 students each).

18 Nov. 2024 **Guest Lecturer** - Durham University (UK)
Lecture for the 2nd-year undergraduate course *'Theoretical Physics 2'* (~220 students).

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 (>1,000 hours).

2020-2021 **Postgraduate Teacher Assistant** -University College London (UK)
Tutorials for 1st-year *'Maths methods'* and *'Atoms, Stars and the Universe'* courses (~30 hours with ~15 students each).

2019-2020 **Postgraduate Teacher Assistant** - University College London (UK)
Marking for 3rd-year *'Physical cosmology'* course (~60 students).

TEACHING TRAINING

Oct. 2024 **Workshop demonstrating training** - Durham University (UK)
Training session on the leading and demonstrating of level 2 and 3 workshops.

May 2024 **'How to write grants that cannot fail'** - Durham University (UK)
Workshop on grant writing for fellowships and research grants.

Sep. 2020 **'Arena One: Gateway Workshop'** - University College London (UK)
Workshop on teaching, learning, and assessment in Higher Education.

OUTREACH

30-31 Oct. 2024 **Augmented and virtual reality stand on dark matter** - *Celebrate Science*, Durham (UK)
Stand at two-day science fair for all ages where people were shown cosmological simulations through VR headsets and an AR gravitational lensing demonstration.
A few hundred children with their families learned about astronomy and cosmology.

9 Aug. 2024 **Augmented reality stand on strong gravitational lensing** - Durham University (UK)
Six-hour session to present strong gravitational lensing to secondary school students from the *OneUkraine* programme through an augmented reality demonstration.
The session gave ~120 students from Ukraine insight into astronomy and career advice.

6-8 Mar. 2020 **Outreach stand on dark matter** - *Your Universe: UCL Festival* (UK)
Creation of outreach posters on gravitational lensing and dark matter. Presentation of short talks and games to primary and secondary school students over three days.
A few hundred school children learned about cosmology through games.

18 Dec. 2018 **Talks on careers in STEM at a secondary school** - *Institut Manuel Sales i Ferré* (Spain)
Series of eight career talks given to secondary school students of all levels.
More than 200 students received advice for careers in STEM in Spain and abroad.

HONOURS, AWARDS AND GRANTS

2025 ***RAS Postdoc Poster Prize*** (£350) - Royal Astronomical Society

2025 ***ESA Academy Short Course Scholarship*** (2,700€) - ESA Academy
Allocation of three student scholarships to the *ASTRODAT* workshop.

2025 ***STFC Astronomy workshop grant*** (£5,000) - UK Research and Innovation
Funding to organise and host the *ASTRODAT* workshop at Durham University.

2019-2023 ***STFC PhD Studentship*** (~£86,400) - UK Research and Innovation
Full stipend for living expenses and tuition fees.

2019 **Prize for best research proposal presentation** (£100) - Imperial College London

2015 **Título de Bachillerato with honours** - Institut Manuel Sales i Ferré
One year of free tuition in Spain (not claimed).

2013-2015 ***Youth and Science Program*** - Catalunya-LaPedrera Foundation
Full scholarship for three summer research visits.

2013-2014 **Becas Estudia en Canadá** - *Amancio Ortega Foundation*
Full scholarship for one year of high school in Canada.

TALKS AND SEMINARS

INVITED

03/10/2025 - Cosmology seminar on lensing — *Oskar Klein Centre*, *Stockholm University* (Sweden)
01/10/2025 - Machine learning seminar on SBI — *Oskar Klein Centre*, *Stockholm University* (Sweden)
11/09/2025 - Seminar on practicalities of SBI — *ASTRODAT, Durham University* (UK)
25/05/2025 - Review of SBI in astrophysics & cosmology — *SBI for galaxy evolution, University of Bristol* (UK)
23/05/2025 - Seminar on SBI in strong and weak lensing — *Max Planck Institute for Astrophysics* (Germany)
17/10/2024 - Seminar on KiDS SBI results — *Institut d'Astrophysique de Paris*, *Sorbonne U.* (France)
27/06/2024 - Cosmology seminar on KiDS SBI results — *Queen Mary University of London* (UK)
27/03/2024 - Talk on simulation-based inference and KiDS results — *University of Edinburgh* (UK)
12/03/2024 - Talk on simulation-based inference and KiDS results — *Imperial College London* (UK)
20/10/2023 - (Remote) Talk on the covariance of KiDS — *Inter-Science Taskforce: NL, Euclid consortium*
09/03/2023 - Seminar on SBI of cosmic shear — *Durham University* (UK)
11/03/2020 - Talk on magnification bias in galaxy-galaxy lensing — *University of Edinburgh* (UK)

CONTRIBUTED

17/09/2025 - Conference talk on forward modelling beyond 2pt — *Beyond 2pt*, *Kavli IPMU* (Japan)
10/06/2025 - Conference talk on strong lensing SBI — *S.S.S. & SIDM*, *IFIC-CSIC* & *U. de València* (Spain)

26/05/2025 - Talk on galaxy-halo connection modelling *SBI for galaxy evolution, University of Bristol* (UK)
14/05/2025 - Conference talk on radiation damage in *Euclid* *8th RDW*, *Open University* (UK)
08/04/2025 - Conference talk on strong lensing SBI *DMutGL*, *University of Hong Kong* (China)
26/03/2025 - Plenary talk on systematics in Euclid *Euclid Consortium Meeting*, *Leiden* (Netherlands)
25/03/2025 - Conference talk on galaxy-halo connection *Euclid Consortium Meeting*, *Leiden* (Netherlands)
09/01/2025 - Conference talk on SBI in cosmology *DEX XXI*, *Newcastle University* (UK)
08/11/2024 - Talk on SBI for strong and weak gravitational lensing *FLAT*, *Durham University* (UK)
16/10/2024 - Talk on the CTI calibration *OU-VIS Meeting, Euclid Consortium*, *Sorbonne U.* (France)
10/07/2024 - Conference talk on KiDS results *CosmoVerse*, *Jagiellonian University in Krakow* (Poland)
18/06/2024 - Conference talk on SBI *Euclid Consortium Meeting*, *Sapienza Università di Roma* (Italy)
21/05/2024 - Conference talk on KiDS results and SBI *COSMO21, Chania (Greece)*
13/05/2024 - Conference talk on SBI *UK Cosmology Meeting/Ruth Fest, King's College London* (UK)
15/04/2024 - Poster presentation *Challenging the standard cosmological model, Royal Society* (UK)
10/04/2024 - Conference talk on LSS simulations *SBI for galaxy evolution, University of Bristol* (UK)
21/02/2024 - (Remote) Talk on variable depth in Euclid cosmic shear *University of Innsbruck* (Austria)
14/12/2023 - Talk on variable depth in Euclid cosmic shear *Royal Astronomical Society* (UK)
16/11/2023 - Seminar on simulation-based inference (SBI) *Durham University* (UK)
26/09/2023 - Seminar on SBI at a KiDS collaboration meeting *Ruhr-University Bochum* (Germany)
05/10/2022 - Talk on SBI and numerical covariance at a KiDS meeting *University of Hull* (UK)
18/05/2022 - Talk on SBI at a KiDS collaboration meeting *NCNR/NCBJ, Warsaw* (Poland)
22/04/2022 - Conference talk on SBI of cosmic shear *LFI in Paris*, *ENS* (France)
04/12/2020 - Seminar on statistical dimensionality reduction *University College London* (UK)
23/11/2020 - (Remote) Talk on magnification bias at KiDS meeting *Ruhr-Universität Bochum* (Germany)

PROFESSIONAL MEMBERSHIPS

2025-Now **Fellow of the *Durham Institute of Research, Development, and Invention* (FDIRDI)**
2025-Now **Member of the *University College Durham SCR***
2021-Now **Fellow of the *Royal Astronomical Society* (FRAS)**
2021-Now **Member of the *European Astronomical Society***
2019-Now **Associate of the *Royal College of Science* (ARCS)**

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.
- Proficient understanding of Python scientific packages such as numpy, scipy, pandas, and matplotlib.
- Experienced in the use, deployment and development of machine learning algorithms/AI, e.g. torch.
- Use of high-throughput computing: COSMA8, NERSC Perlmutter, 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 *VIS_CTI*, *GLASS* and *nonLimber_matter_shells*.

Language skills

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

PUBLICATIONS (citations: 1,115, h-index: 12 according to *NASA ads*)

MAIN AUTHOR

von Wietersheim-Kramsta, M., Lin, K., et al. (2025). KiDS-SBI: Simulation-Based Inference Analysis of KiDS-1000 Cosmic Shear. *A&A,* 695, A223.

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

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

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

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. *MNRAS*, 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.

CONTRIBUTING AUTHOR

Massey, R., Kegerreis, J. A., Barrios, J. P. L. G., Nightingale, J. W., Hayes, R. G., Lagattuta, D., ... **& von Wietersheim-Kramsta, M.** (2025). Radiation damage to the Hubble Space Telescope during two Solar cycles, and correction of Charge Transfer Inefficiency. Submitted to *MNRAS*.

Contributions: Development plus testing of code and review of the manuscript.

Broxterman, J. C., Simon, P., Porth, L., Kuijken, K., Wright, A. H., Asgari, M., ... **& von Wietersheim-Kramsta, M.** (2025). Matter power spectrum reconstruction with KiDS-Legacy: Improved internal $\Lambda $ CDM consistency and preference for strong baryonic feedback. Submitted to *A&A*.

Contributions: Builder of KiDS weak lensing analysis, manuscript review.

He, Q., Robertson, A., Nightingale, J. W., Amvrosiadis, A., Cole, S., Frenk, C. S., ... **& von Wietersheim-Kramsta, M.** (2025). Not so dark, not so dense: an alternative explanation for the lensing subhalo in SDSSJ0946+ 1006. *ApJL*, 991, L53.

Contributions: Interpretation of statistical results and review of the manuscript.

Li, S., Li, R., Wang, K., Jia, Z., Cao, X., Frenk, C. S., ..., **von Wietersheim-Kramsta, M**., & Ma, X. (2025). The "Little Dark Dot": Evidence for Self-Interacting Dark Matter in the Strong Lens SDSSJ0946+1006?. Submitted to *MNRAS*.

Contributions: Interpretation of statistical results and review of the manuscript.

Reischke, R., Unruh, S., Asgari, M., Dvornik, A., Hildebrandt, H., Joachimi, B., Porth, L., **von Wietersheim-Kramsta M**., et al. (2025). KiDS-Legacy: Covariance validation and the unified OneCovariance framework for projected large-scale structure observables. *A&A,* 699, A124.

Contributions: Authorship of numerical covariance sections, coordinator of forward modelling efforts, development and testing of forward simulations, review of the manuscript.

Wright, A. H., Stölzner, B., Asgari, M., Bilicki, M., Giblin, B., Heymans, C., …, **von Wietersheim-Kramsta, M.,** ... & Zhang, Y. H. (2025). KiDS-Legacy: Cosmological constraints from cosmic shear with the complete Kilo-Degree Survey. *Accepted for publication in Astronomy & Astrophysics.*

Contributions: Authorship of numerical covariance and variable depth appendix, testing of covariance of cosmic shear observables, builder of KiDS weak lensing analysis, manuscript review.

Stölzner, B., Wright, A. H., Asgari, M., Heymans, C., Hildebrandt, H., Hoekstra, H., …, **von Wietersheim-Kramsta, M.,** ... & Zhang, Y. H. (2025). KiDS-Legacy: Consistency of cosmic shear measurements and joint cosmological constraints with external probes. *Accepted for publication in Astronomy & Astrophysics.*

Contributions: Testing of cosmic shear observables covariance, builder of KiDS weak lensing analysis, manuscript review.

Wright, A. H., Hildebrandt, H., Busch, J. L. V. D., Bilicki, M., Heymans, C., Joachimi, B., …, **von Wietersheim-Kramsta, M.,** ... & Zhang, Y. H. (2025). KiDS-Legacy: Redshift distributions and their calibration. *Accepted for publication in Astronomy & Astrophysics.*

Contributions: Builder of KiDS weak lensing analysis, manuscript review.

McCracken, H. J., Benson, K., Dolding, C., Flanet, T., Grenet, C., Herent, O., …, **von Wietersheim-Kramsta, M.**, ... & Martinet, N. (2025). Euclid Quick Data Release (Q1): VIS processing and data products. *Submitted to A&A.*

Contributions: Monitoring, modelling and forecasting of charge-transfer inefficiency data, co-authorship of charge-transfer inefficiency section, review of manuscript.

Mahler, G., Nightingale, J. W., Hogg, N. B., Gozaliasl, G., McCleary, J., He, Q., …, **von Wietersheim-Kramsta, M.,** ... & Jin, S. (2025). The COSMOS-Web Lens Survey (COWLS) II: depth, resolution, and NIR coverage from JWST reveal 17 spectacular lenses. *MNRAS: Letters*, 544(1), L8-L14.

Contributions: Search and classification of lenses, manuscript review.

Nightingale, J., Mahler, G., McCleary, J., He, Q., Hogg, N. B., Amvrosiadis, A., …, **von Wietersheim-Kramsta, M.,** ... & Jin, S. (2025). The COSMOS-Web Lens Survey (COWLS) I: Discovery of> 100 high redshift strong lenses in contiguous JWST imaging. *MNRAS*, 543(1), 203-222.

Contributions: Search and classification of lenses, manuscript review.

Cao, X., Li, R., Nightingale, J. W., Massey, R., He, Q., Amvrosiadis, A., …, **von Wietersheim-Kramsta, M.,** ... & Wang, K. (2025). Probing Dark Matter Substructures with Free-Form Modelling: A Case Study of the Jackpot' Strong Lens. *Submitted to MNRAS.*

Contributions: Interpretation of statistical results and review of the manuscript.

Wang, K., Cao, X., Li, R., Nightingale, J. W., He, Q., Amvrosiadis, A., Massey, R., von Wietersheim-Kramsta, M., ... & Ma, X. (2025). Measuring the Stellar-to-Halo Mass Relation at ~10^10 Solar masses, using space-based imaging of galaxy-galaxy strong lenses. *Submitted to MNRAS.*

Contributions: Interpretation of statistical results and review of the manuscript.

Yan, Z., Wright, A. H., Chisari, N. E., ..., **von Wietersheim-Kramsta, M.** & Yoon, M. (2024). KiDS-Legacy: angular galaxy clustering from deep surveys with complex selection effects. *A&A,* 694, A259.

Contributions: Testing and discussion of variable depth, infrastructure contributions to KiDS.

Johnston, H., Chisari, N. E., Joudaki, S., ..., **von Wietersheim-Kramsta, M.**, Yan, Z. & Zhang, Y. H. (2024). 6x2pt: Forecasting gains from joint weak lensing and galaxy clustering analyses with spectroscopic-photometric galaxy cross-correlations. *A&A*, 699, A127.

Contributions: Infrastructure contributions to the Kilo-Degree Survey, manuscript review.

Euclid Consortium (incl. **von Wietersheim-Kramsta, M.**) (2024). Euclid. I. Overview of the Euclid mission. *A&A*, 697, A1.

Contributions: Science Ground Segment, weak lensing and VIS instrument pipelines.

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

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

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

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

Joachimi, B., Lin, C. A., ..., **von Wietersheim-Kramsta, M.**, et al. (2021). KiDS-1000 methodology: Modelling and inference for joint weak gravitational lensing and spectroscopic galaxy clustering analysis. *A&A*, 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. *JCAP*, 2015(08), 047.

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