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, 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 -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**, **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 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.
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** - *Amancio Ortega Foundation*
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

21/05/2024 - Conference talk on KiDS-SBI *COSMO21, Chania (Greece)*
13/05/2024 - Conference talk on KiDS-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)*
27/03/2024 - (Invited) Talk on KiDS-SBI cosmic shear *University of Edinburgh (UK)*
12/03/2024 - (Invited) Talk on KiDS-SBI cosmic shear *Imperial College London (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 *Durham University (UK)*
20/10/2023 - (Remote) Talk on the covariance of KiDS *Inter-Science Taskforce: NL, Euclid consortium*
26/09/2023 - Seminar on KiDS-SBI at a KiDS collaboration meeting *Ruhr-University Bochum (Germany)*
09/03/2023 - (Invited) Seminar on KiDS-SBI cosmic shear *Durham University (UK)*
05/10/2022 - Talk on KiDS-SBI and numerical covariance at a KiDS meeting *University of Hull (UK)*
18/05/2022 - Talk on KiDS-SBI at a KiDS collaboration meeting *NCNR/NCBJ, Warsaw (Poland)*
22/04/2022 - Conference talk on KiDS-SBI cosmic shear *LFI in Paris*, *ENS (France)*
18/11/2021 - Co-chairing of discussion on KiDS variable depth *University of Leiden (Netherlands)*
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)*
11/03/2020 - (Invited) Talk on magnification bias *University of Edinburgh (UK)*
18/12/2018 - Outreach talks on careers in STEM at a school *Institut Manuel Sales i Ferré (Spain)*

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: 192, 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.

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.