Matthijs VAN DER WILD

Theoretical physicist

matthijs.van-der-wild@durham.ac.uk | matthijs.vanderwild.com | 0000-0002-3949-3063
M.L.Van.Der.Wild.1 | vanderwild_m_1 | lonbar

Education

PhD (2015–2019)
quantum cosmology
University of Freiburg
Inflation and quantum geometrodynamics in scalar-tensor theories
supervised by
prof. dr. **J. J. van der Bij**

MSc (2012–2015)
theoretical physics
Leiden University
The supersymmetric non-linear sigma model on $SU(2N)$
supervised by
prof. dr. **J. W. van Holten**

BSc (2009–2012)
physics
Leiden University
On the folding of flavodoxin
supervised by
dr. **Martina Huber**

Positions held

2021 – present: LOFAR software engineer, Durham Univerity
- Implemented a data processing pipeline for very long baseline interferomery
- Developed tools that enable and facilitate data processing on computing clusters
- Organised and lead dedicated pipeline development workshops for the LOFAR long baseline working group
- Supported radio astronomers in analysing large datasets generated by the international LOFAR telescope
- Informally supervised students in radio astronomy and software development
- Acted as an instructor in undergraduate workshops

2019 – 2020: Visiting scholar, University of Freiburg
- Formulated the *Cosmology from Home* conference format

2015 – 2019: Doctoral researcher, University of Freiburg
- Generalised canonical quantisation methods for scalar-tensor theories of gravity
- Calculated corrections due to quantised theories of modified gravity in inflationary cosmology
- Tutored students in theoretical physics
- Acted as an instructor in graduate lectures on general relativity

2011 – 2015: Student-assistant, Leiden University
- Tutored first-year students in general phyics during regular meetings
- Assisted in the preparation of homework exercises and exams for theoretical physics
- Assisted students with homework exercises in theoretical physics

Skills

Operating Systems	Linux (Gentoo, Archlinux, Ubuntu), MacOS, Windows
Programming Languages	C/C++, Python, Lua, Bash
Workflow Automation	(C)Make, cwl, Latexmk
Virtualisation	chroot, Docker, Apptainer/Singularity
Batch Systems	slurm, torque
Computer Algebra Systems	Maple, Mathematica, Matlab, SageMath, Form, xACT
Typesetting	LaTeX, ConTeXt, LuaTeX
Graphing/Plotting	gnuplot, Asymptote, metapost
Languages	Dutch, English, German, Latin, Middle Egyptian

Publications

[1] M. van der Wild *et al.*, PILoT: an automated portable and scalable Pipeline for the International LOFAR Telescope, (2025, in prep.).

[2] N. Šarčević and M. van der Wild, Fisher Inference for Systematics in Kosmology (fisk): A Fisher Analysis Pipeline, (2025, in prep.).

[3] Sustainable hecap+ Initiative, Environmental sustainability in basic research: a perspective from HECAP+, *ArXiv e-prints* (2023). (arxiv:2306.02837)

[4] Christian F. Steinwachs and Matthijs L. van der Wild, Quantum gravitational corrections to the inflationary power spectra in scalar-tensor theories, *Class. Quant. Grav.* **36**(24), 245015 (2019).

[5] Christian F. Steinwachs and Matthijs L. van der Wild, Quantum gravitational corrections from the Wheeler–DeWitt equation for scalar–tensor theories, *Class. Quant. Grav.* **35**(13), 135010 (2018).

[6] van Son M., S. Lindhoud, van der Wild M., van Mierlo C.P.M., and M. Huber, Double Electron–Electron Spin Resonance Tracks Flavodoxin Folding, *J. Phys. Chem. B* **119**(43), 13507–13514 (2015).

Public Code

2024 **flocs lofar containers**, software containers with lofar tools for hpc processing

2023 **Derivative Calculator**, a robust derivative calculator using least-square fitting, useful for Fisher analyses

Synfo, a workflow that collects system resource allocation statistics

lofar vlbi Common Workflow Language pipeline, for automated data processing on hpc clusters

2022 **Pipeline batch scripts**, a collection of shell scripts that facilitate hpc pipeline processing

2021 **CosmΩracle**, an interactive mobile-friendly cosmological distance calculator

2021 **hep-astro-cosmo**, a curated list of scientific software used in astrophysics, hep and cosmology

Data visualisation, an interactive applet demonstrating the Standard Model of particle physics

Talks

2023 **Lessons learned from building lofar data pipelines**, adass 2023, Tucson, USA

2020 **Quantum gravitational predictions in inflationary scalar-tensor theories**, *CosmoConβ*, virtual

2019 **Quantum-gravitational corrections to the inflationary power spectrum in scalar-tensor theories**, Bad Honnef, Germany

2018 **Quantum gravitational corrections from the Wheeler-DeWitt equation for scalar-tensor theories**, Freiburg, Germany

Quantum gravitational corrections from the Wheeler-DeWitt equation, DPG spring conference, Würzburg, Germany

2017 **The Wheeler-DeWitt equation of scalar-tensor theories**, RTG fall workshop, Breisach, Germany

2016 **A non-perturbative analysis of quantum frame dependence**, Herbstschule für Hochenergiephysik, Maria Laach, Germany

A non-perturbative analysis of quantum frame dependence, RTG fall workshop, Gengenbach, Germany

Conferences and Workshop Organisation

2024 **Cosmology from Home 2024**,

Neutrinos from Home 2024,

2023 **Parity Violation from Home 2023**,

A crash course on Common Workflow Language and self-calibration with LOFAR,

Cosmology from Home 2023,

2022 **Cosmology from Home 2022**,

2022–2024 **LOFAR busy weeks**, sprint weeks of the LOFAR long-baseline working group,

2021 **Cosmology from Home 2021**,

2021–present **Cosmology Talks mini-workshops**,

2020 **Cosmology from Home 2020**,

CosmoConβ—Cosmology from Home,

Conferences attended

2024 **SRCNet PI25 planning**, Jordrell Bank SKAO headquarters (United Kingdom)

2023 **Astronomical Data Analysis Software & Systems XXXIII**, Tucson Arizona (attended remotely)

2022 **LOFAR family meeting 2022**, Cologne (Germany)

2020 **Cosmological Correlators**, held virtually

EAS 2020 virtual annual meeting, held virtually

ESO: H_0 2020, held virtually

2019 **XXXI Workshop Beyond the Standard Model**, Bad Honnef (Germany)

2018 **DPG spring conference**, Würzburg (Germany)

RTG fall workshop, Hornberg (Germany)

2017 **DPG spring conference**, Bremen (Germany)

RTG fall workshop, Breisach (Germany)

2016 **RTG fall workshop**, Gengenbach (Germany)

54th Schladming Winter School of Theoretical Physics, Schladming (Austria)

48. Herbstschule für Hochenergiephysik, Maria Laach (Germany)

Teaching

Durham University

2024–2025 **Stars and Galaxies**

Astrophysics; physics of stellar interiors, pulsating and binary stars, galactic and extragalactic astronomy.

2023–2024 **Stars and Galaxies**

Astrophysics; physics of stellar interiors, pulsating and binary stars, galactic and extragalactic astronomy.

2021–2022 **Stars and Galaxies**

Astrophysics; physics of stellar interiors, pulsating and binary stars, galactic and extragalactic astronomy.

University of Freiburg

SS 2018 **TP 1: Mechanik und Spezielle Relativitätstheorie**

Newtonian, Lagrangian and Hamiltonian mechanics, relativity theory

WS 2017 **TP 2: Elektromagnetismus und Optik**

Electrodynamics in vacuo and in matter, electromagnetic waves, relativity theory

SS 2017 **TP 1: Mechanik und Spezielle Relativitätstheorie**

Newtonian, Lagrangian and Hamiltonian mechanics, relativity theory

WS 2016 **TP 2: Elektromagnetismus und Optik**

Electrodynamics in vacuo and in matter, electromagnetic waves, relativity theory

SS 2016 **TP 1: Mechanik und Spezielle Relativitätstheorie**

Newtonian, Lagrangian and Hamiltonian mechanics, relativity theory

Leiden University

2015 **Statistische Fysica 1**

Statistical physics: thermal equilibrium, entropy, phase space, ensembles, Maxwell relations, magnetism

2014–2015 **Quantummechanica 1**

Foundational quantum mechanics: Schrödinger equation and applications, uncertainty relation, Hilbert spaces, Dirac notation, hydrogen atom, spin

2014–2015 **Wiskunde Basisvaardigheden**

Mathematical techniques: complex representations, differential equations, geometry

2014–2015 **Tutor for first-year students**

Weekly discussion sessions regarding course material, assist students with study related problems

2013–2014 **Quantummechanica 2**

Advanced quantum mechanics: quantum statistics, time independent and dependent perturbation theory

2012–2013 **Tutor for first-year students**

Weekly discussion sessions regarding course material, assist students with study related problems

2012–2012 **Elektrische en Magnetische Velden**

Foundational electromagnetism: electrostatics and magnetostatics, Maxwell's equations, electrodynamics, electromagnetic waves

2011–2012 **Tutor for first-year students**

Weekly discussion sessions regarding course material, assist students with study related problems

2011–2012 **Speciale Relativiteitstheorie**

Special relativity: Einstein's postulates, spacetime geometry, Lorentz transformations, four-vectors

Supervision

2021–2022 **James Petley** (PhD at Durham University, unofficial),

2017–2018 **Lokesh Mishra** (MSc at Freiburg University, unofficial), Currently a research scientist at IBM Research, Zürich.

Outreach

2022 **Xmas Lecture Guest Speaker**, Teesside University, Middlesbrough, UK

Calculating distances in cosmology with Streamlit, with Niko Šarčević and Marco Bonici

Summer Science Program Cosmo 2022 Guest Lecturer, Summer Science Program, Virtual

Easter Lecture Guest Speaker, Durham University, UK

2021 **Xmas Lecture Guest Speaker**, Teesside University, Middlesbrough, UK

The effects of self-interacting dark matter on the stripping of galaxies that fall into clusters (editor, Dutch version of Astrobites article)

2020 **Astrobites goes multi-lingual!** (editor, Dutch version of Astrobites article)

Media Coverage

2021 **Moving conferences online: tips from the organisers of Cosmology from Home**, Astrobites