Christian Aarset (*he/him*)

Personal details

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ORCID	0000-0001-8163-9305
Nationality	Norwegian

Research Interest

- Optimal experimental design (main focus area)
- Bayesian inverse problems
- Passive imaging and correlation data
- Scientific computation for large-scale problems
- Machine learning
- Optimisation
- Dynamical systems and bifurcation theory

Language skills

Norwegian	Native speaker
English	IELTS: C2, Expert
German	C1, Advanced
Romanian	Advanced
French	Intermediate
Japanese	Beginner
Vietnamese	Beginner

Degrees

2020 – 2016	**Doctor of Technical Science** – *University of Klagenfurt, Austria* Bifurcations in periodic integrodifference equations Field: Dynamical systems. Dated: 08.07.2020
2016 – 2013	**Master of Mathematics** – *University of Oslo, Norway* On the continuity of the spectrum of fields of normal operators Field: Functional analysis
2013 – 2011	**Master of Mathematics** – *University of Oslo, Norway* The d-bar equation on laminations of Riemann surfaces Field: Complex analysis

Other education and expertise

2017	Lehrkompetenz entwickeln ("Developing teaching competence") Earned qualification for teaching at the University of Klagenfurt

Current employment

2028 – 2026	**Postdoctoral researcher** – *Aix-Marseille University, School of Economics, France* Postdoctoral researcher ○ Primary project: Machine learning for time-dependent PDEs, with applications to real-world cardiovascular modelling

Previous work experience

2026 — 2022	**Postdoctoral researcher** – *University of Göttingen, Institute for Numerical and Applied Mathematics, Germany* Associate Member, CRC 1456 – C04 (Mathematics of Experiment – Correlations of solar oscillations: modeling and inversions) ○ Primary project: Developing the novel theory of optimal experimental design with correlation data in PDE-driven applications from physics ○ Investigated Bayesian inverse problems for random source problems, combining regularisation theory, stochastics and matrix theory ○ Developing Python toolbox OptOED. Algorithmic OED for general PDE-driven applications and large scale computing ○ Co-development of package regpy for algorithmic inverse problems ○ Secondary project: Bi-level mesh refinement with Dr. Tram Nguyen ○ Research stay at Courant Institute of Mathematical Sciences (Jan-Feb 2025)
2022 — 2020	**Postdoctoral researcher** – *University of Graz, Inst. Math. and Sc. Comp., Austria* Research and teaching responsibility, industrial collaboration ○ Primary project: SOLARHIS (FFG Grant 881561). Energy disaggregation via smart meter readings ○ Main author of Python toolbox CSC (**C**onvolutional **S**parse **C**oding). Learned disaggregation of household energy consumption data ○ Secondary project: Physics-informed learning, utilising machine learning and inverse problems to learn non-linearities in time-dependent PDEs.
2020 — 2020	**Postdoctoral researcher** – *University of Bergen, Department of Mathematics, Norway* Solo proposal Bifurcations in Micro-Macro Evolution Models to MSCA-IF 2020 call. Top **12%**, received Seal of Excellence. ○ Population models: **Bi**furcation theory in **Mi**cro- and **Ma**croevolution ○ Interdisciplinary meetings: Centre for Eco. & Evo. Synthesis, Norway ○ Secondary project: Bifurcation theory for cracks in porous media
2020 — 2016	**Graduate Researcher** – *University of Klagenfurt, Department of Mathematics, Austria* Research and lecture responsibilities, member of doctoral college Karl Popper ○ Primary project: Bifurcations in periodic integro-difference equations

Research supervision and leadership experience

2025 — 2023	**Co-supervision of bachelor student** – *University of Göttingen, Germany* Thesis topic: Unrolled first-order methods via neural networks Exploration and comparison of unrolled approaches for sparse regression
2022 — 2020	**SOLARHIS Project** – *University of Graz, Austria* Industrial collaboration project Instruction of doctoral student in preparing Python code Liaison with industry partner

Teaching merits

2025 — 2022	**Teacher** – *University of Göttingen, Germany* Teaching, exercises and exams, revising lecture notes, authoring programming exercises and coded solutions, 4 hours/week (English, postgraduate courses): Winter 2023 Inverse Problems III; Winter 2022 Inverse Problems I; Summer 2023 Inverse Problems II
2022 — 2020	**Teacher** – *University of Graz, Austria* Teaching, exercises and exams, 2 hours/week (German): Summer 2022 Analysis II for Teachers; Summer 2021 Analysis II for Teachers; Winter 2021 Analysis I; Winter 2020 Analysis I

2020 — 2016

Teaching Assistant – *University of Klagenfurt, Austria*

Teaching, exercises and exams, 2-4 hours/week (German/English):

Summer 2020	Analysis 2 Analysis für Informatik Methodology 1: Mathematics	Summer 2019	Analysis 2	Summer 2018	Analysis 2
Winter 2019	Analysis 1 & 3	Winter 2018	Analysis 1		

Awards and honours

2024	Trusted Reviewer for IOP Inverse Problems
2010	Norwegian Chemistry Olympiad, Contestant
2010	Niels Henrik Abel Mathematics Competition, 8th Place

Research funding and grants

2025

DFG Sachbeihilfe

Currently composing and planning to submit solo proposal:

Funder	DFG
Title	SENSORA: Sensor Shape Optimisation for Aeroacoustics
Duration	3 years
Fellow/PI	Christian Aarset
Result	To be submitted
Partners	TBD

2024

Klaus Tschira Boost Fund

Solo proposal:

Funder	Klaus Tschira Foundation
Title	OEDAS: Optimal Experimental Design for Aeroacoustic Sensing
Duration	1.5 years
Fellow/PI	Christian Aarset
Result	Not funded
Partners	Georg-August Universität Göttingen, Germany

2022

Arqus Career Week, University of Graz

Received and declined funding offer, approx. €1000

2021

H2020-MSCA-Individual Fellowship call

Composing and submitting solo proposal:

Funder	Horizon Europe: Marie Sklodowska-Curie Actions Individual Fellowships 2020
Title	BiMiMa: Bifurcations in Micro-Macro Evolution Models
Duration	2 years
Fellow/PI	Christian Aarset
Total score	**88.80%** (top **12%** out of 11573 proposals)
Result	Seal of Excellence – Given to top-quality proposals recommended for funding by other sources
Partners	Universities of Bergen and Oslo, Norway

2019

Young Scientist Mentoring Program, University of Klagenfurt

Received funding approx. €800 for research visit to Prof. Robert Skiba, Nicolaus Copernicus University in Torun, Poland

2018

Young Scientist Mentoring Program, University of Klagenfurt

Received funding approx. €900 for research visit to Prof. Wojciech Kryszewski, Nicolaus Copernicus University in Torun, Poland

Research output

2024	**C. Aarset** Global optimality conditions for sensor placement, with extensions to binary low-rank A-optimal designs Inverse Problems **41**, 39pp, p. 065013 Sole author
2024	**C. Aarset**, A. Habring, M. Holler, M. Mitter Unsupervised Energy Disaggregation Via Convolutional Sparse Coding IEEE Transactions on Consumer Electronics 70(**1**), pp. 4303-4310 Main author of theoretical aspects and accompanying software toolbox
2023	**C. Aarset**, M. Holler, T. Nguyen Learning-informed parameter identification in nonl. time-dep. PDEs Appl. Math. Optim. 88, 53pp, Art. Id. 76 Architecture-based convergence guarantees and verification
2021	**C. Aarset**, C. Pötzsche Bifurcations in periodic integrodifference equations in C(Ω) I Discrete & Continuous Dynamical Systems – B, 26(1), 60pp, AIMS Main author, theoretical bifurcation conditions and numerical verification
2020	**C. Aarset**, C. Pötzsche Bifurcations in periodic integrodifference equations in C(Ω) II Communications on Pure & Applied Analysis, 19(4), 28pp, AIMS Main author, theoretical bifurcation conditions and numerical verification

Proceedings

2025	**C. Aarset**, T. Nguyen A-optimal sensor placement for the heat equation with final time measurement To be submitted to the Proceedings of IFIP TC7 Optimal experimental design, theory and implementation
2024	**C. Aarset** A global optimum-informed greedy algorithm for A-OED Inverse Problems: Modelling and Simulation – Extended Abstracts of the IPMS Conference 2024, Birkhäuser Cham Sole author
2024	**C. Aarset**, T. Nguyen Bi-level regularization via iterative mesh refinement for aeroacoustics Inverse Problems: Modelling and Simulation – Extended Abstracts of the IPMS Conference 2024, Birkhäuser Cham Numerical analysis and implementation

Publications in Preparation

C. Aarset, T. Hohage, G. Stadler
Optimal experimental design for inverse problems with correlation data
Main author, theoretical and numerical analysis

C. Aarset, M. Knöller, T. Nguyen
Sensor placement for a 3D inverse source problem
Main author of optimal experimental design-related content

T. Nguyen, **C. Aarset**, K. Straatman
FEM-based reconstruction of reaction laws in reaction-advection-diffusion systems: bi-level vs reduced and all-at-once inversion
Co-author, finite element theory and implementation

T. Nguyen, **C. Aarset**, B. Kaltenbach
Data assimilation via model reference adaptation for linear and nonlinear dynamical systems
Co-author, dynamical systems and computational aspects

Authored Software

2025	**OptOED** (Python) – Efficient A-optimal experimental design for PDEs
2022	**CSC** (Python) – Industry-scale unsupervised learning for disaggregation
2018	**IDEPack** (MATLAB) – Numerical bifurcation analysis

Published Reviews

2019 **C. Aarset**: Nonautonomous periodic difference equations: With applications in populations dynamics and economics
Jour. of Difference Eq. and App., 25(4), 597-598, Taylor & Francis

Other key academic merits

International Conferences – Organisation

2025	**ENUMATH 2025** Organising minisymposium: "Num. Methods for PDE-based Inverse Problems"
2025	**AIP 2025** Organised and chaired minisymposium: "Optimal experimental design for inverse problems and related topics"
2024	**IFIP TC7 System Modeling and Optimization** Organised and chaired minisymposium: "Correlation-based passive imaging and optimal experimental design"
2023	**6th European Conference on Computational Optimization** Organised and chaired focus session: "Inverse Problems"
2023	**11th Applied Inverse Problems Conference** Local organizer, Technical support Chaired two contributed sessions

International Conferences – Invited Talks

2026	**IPMS 2026** To give invited talk: Low-rank modelling for optimal experimental design
2025	**ENUMATH 2025** Invited talk: Optimality criteria in sensor placement
2025	**AIP 2025** Invited talk: Optimality Conditions in OED
2024	**IPMS 2024 Inverse Problems: Modeling and Simulation** Invited talk: Optimal experimental design in aeroacoustics
2024	**IFIP TC7 System Modeling and Optimization** Invited talk: OED for correlation data in aeroacoustics
2023	**6th European Conference on Computational Optimization** Invited talk: Optimal experimental design under correlation
2019	**Dynamics, Equations and Applications** Invited talk: Dynamics for Spatially Distributed Populations
2018	**Nonlinear Analysis and Boundary Value Problems 2018** Invited talk: Bifurcations in periodic IDEs

Other Talks, Presentations and Posters

2025	**MAKUTU, Pau** Talk: Optimal experimental design, large-scale computation and passive imaging
2025	**New York University** Talk: Low-rank techniques for optimal experimental design
2023	**CRC 1456 Retreat, University of Göttingen** Tutorial: Optimal Experimental Design
2023	**Chemnitz Symposium on Inverse Problems** Talk: OED for correlation data in aeroacoustics
2023	**11th Applied Inverse Problems Conference** Talk: Correlation Data and Experimental Design
2022	**LMS Invited Lectures on Mathematics of Deep Learning** Poster: Energy disaggregation via unsupervised learning
2021	**2nd Alps-Adriatic Inverse Problems Workshop 2021** Talk: iPALM-based unsupervised energy disaggregation
2021	**Joint Research Group Seminar, Technical University of Graz** Talk: Unsupervised energy disaggregation via convolutional sparse coding

Academic Citizenship

	Reviewer for IOP Inverse Problems
	Reviewer for Machine Learning: Science and Technology
	Reviewer for Springer Machine Learning
2020 – 2018	Ph.D. Vice Speaker Alpen-Adria Universität Klagenfurt

Professional Memberships

Inverse Problems International Association German Speaking Inverse Problems Society

Public outreach

2021	**Alumni Chapter NORDICS**, University of Graz, Austria Gave interview on the role of mathematics in science
2020	**"Mathematischer Blick in die Glaskugel"** – Interview, Der Standard Popular scientific description of my work on bifurcation theory in ecology and its potential impact in one of Austria's largest newspapers

Academic References

Univ.-Prof. Dr. Thorsten Hohage – Previous group leader
Professor for Inverse Problems, Fellow at MPI Solar System Research
Institute for Numerical and Applied Mathematics
University of Göttingen
Contact: +49 (0)551-39 4529, hohage@math.uni-goettingen.de

Univ.-Prof. Dr. Georg Stadler – Co-author on optimal experimental design
Professor of Mathematics and Computer Science
Courant Institute of Mathematical Sciences
New York University
Contact: +1 212 998 3111, stadler@cims.nyu.edu

Assoc.-Prof. Dr. Anne Wald – Joint supervision of bachelor student
Chair for Applied Mathematics in the Natural Sciences
Institute for Numerical and Applied Mathematics
University of Göttingen
Contact: +49 (0)551-39 24393, a.wald@math.uni-goettingen.de

Assoc. Prof. Dr. Martin Holler – Former group leader
Head of the research group "Mathematics of data science"
Department of Mathematics and Scientific Computing
University of Graz
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