LIE-STØRMER CENTER

Cordian B. Riener

Curriculum vitae with 10-year track record

Role in the project: Director

Personal information

First name Cordian Benedikt
Surname: Riener
Sex: Male
Date of birth: April 9^{th} 1981
Nationality: Austrian

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Education

2018 **Habilitation in Mathematics**, *Universität Konstanz*, Germany
2013 **Magister Artium Philosophy**, *Goethe University Frankfurt*, Germany
2011 **Dr. phil. nat.**, *Goethe University Frankfurt*, Germany
2006 **Diplom in Mathematical economy**, *University of Ulm*, Germany
2005 **Master in pure Mathematics**, *Université de Bordeaux 1*, France

Employment History

2019- **Professor**, *UiT – The Arctic University of Norway*
2018–2019 **Associate Professor**, *UiT – The Arctic University of Norway*
2016–2018 **Interim Professor**, *Universität Konstanz, Germany*
2012–2016 **Aalto Science Fellow**, *Aalto University*, Finnland
2011–2012 **Postdoctoral Fellow**, *Zukunftskolleg*, Universität Konstanz, Germany

Project management experience

2022–2025 **coPI**, *Mathematical Structures in Computations*, Aurora Initiative of UiT (Strategical University Fund), (~ 30 MNOK)
2022–2025 **PI**, *Symmetry in Quantitative and Algorithmic Real Algebraic Geometry (Part 2)*, Trond Mohn Foundation, (~ 4 MNOK)
2019–2022 **local PI**, *Polynomial Optimization, Efficiency through Moments and Algebra*, 2020-MSCA-ITN, (total ~ 40 MNOK, local ~ 3 MNOK)
2018–2022 **PI**, *Symmetry in Quantitative and Algorithmic Real Algebraic Geometry (Part 1)*, Trond Mohn Foundation, (~ 7 MNOK)

Supervision of students

Master's students	Ph.D. students	University	Country
1		Goethe University Frankfurt	Germany
5		Universität Konstanz	Germany
1		FU Berlin	Germany*
1	1	University of Cologne	Germany*
1		Universität Wien	Austria
5	3	UiT – The Arctic University of Norway	Norway†

* joint co-supervision † current PhD students

Institutional and academic responsibilities

2021 **Pro-dean**, *Faculty of science and technology*, UiT–The Arctic University of Norway

2021 **Comittee member**, *SIAG/Algebraic Geometry Early Career Prize*, SIAM

2020– **Scientific Advisory Board member**, *Effective Methods in Algebraic Geometry*

2020 **(Interems) vice-head**, *Dep. Math. and Statistics*, UiT – The Arctic University of Norway

2020– **Steering board member**, *Norwegian Mathematical Society*

2019–2020 **Faculty board member**, *NT-faculty*, UiT – The Arctic University of Norway

2019– **Research group leader**, *Algebra Research Group*, UiT – The Arctic University of Norway

2014–2015 **Steering group member**, *Aalto Science Institute*, Aalto University, Finland

2009–2011 **Faculty board member**, *Math-CS Faculty*, Goethe University Frankfurt, Germany

Mobility: visits of duration at least three months

2015 Fields Institute: Thematic Program on Computer Algebra

2010 IPAM (UCLA): Program on Modern Trends in Optimization and Its Application

Outreach activities

I am passionate about sharing my fascination for mathematics also outside the normal scientific channels. To this end, I am actively involved in UiT Skolelab, where school classes can visit the university, and the Northern Norwegian science center, where I organised events for visitors to explore mathematics. Furthermore, I initiated the LAUMA (**L**earning **a**nd **U**nderstanding **Ma**thematics) initiative which aims to focus outreach activities and to cross academic boundaries to discuss, explore, and research the status of mathematics as part of our society. Finally, I organised events to promote the diversity of mathematics, in particular the Women of Mathematics photo exhibition at UiT.

10-year track record

Starting with my PhD which I obtained in 2011, I have expanded my research areas, grew a large international network of collaborations and, in particular within the last three years, I have built up a very active and successful research group in the interplay of algebraic geometry and optimization at UiT in Tromsø. Through a competitive scheme to strengthen promising research groups I have established an initiative to build a research focus (Aurora Center) in mathematical structures in computation together with my colleague Boris Kruglikov. Further, I secured external funding for postdoctoral fellows (2) and PhD students (2) with both Norwegian, as well as European funding. My main recent scientific achievements provide a novel understanding of symmetries in the context of algorithmic tasks arising within real algebraic geometry.

- Publications in peer-reviewed journals and conference proceedings (counted since 2011): **17**
- Editor of special issue proceedings since 2011: **1**
- Invited presentations (counted since 2011): **30**
- Citations of articles (Google): **241**

Ten selected publications (since 2011)

- S. Basu, C. Riener. Vandermonde varieties, mirrored spaces, and the cohomology of symmetric semi-algebraic sets **Foundations of Computational Mathematics**,(to appear).
- G. Blekherman, C. Riener. Symmetric nonnegative forms and sums of squares, **Discrete and Computational Geometry** 65,764–799, 2021.
- G. Blekherman, M Kummer, C. Riener, M. Schweighofer, C. Vinzant. Generalized eigenvalue methods for Gaussian quadrature rules, **Annales Henri Lebesgue** 3 1327 – 1341, 2020.
- S. Basu, C. Riener. On the isotypic decomposition of cohomology modules of symmetric semi-algebraic sets: polynomial bounds on multiplicities, **International Mathematics Research Notices** 2020 (7), 2054–2113, 2020.
- C. Riener, M.Schweighofer. Optimization approaches to quadrature: New characterizations of Gaussian quadrature on the line and quadrature with few nodes on plane algebraic curves, on the plane and in higher dimensions, **Journal of Complexity** 45, 22 – 54, 2018.
- T. Friedl, C. Riener, S. Sanyal. Reflection groups, reflection arrangements, and invariant real varieties, **Proceedings of the AMS** 146 (3), 1034 – 1045, 2018.
- S. Basu, C. Riener, On the equivariant Betti numbers of symmetric definable sets: vanishing, bounds and algorithms, **Selecta Mathematica** 24 (4), 3241– 328, 2018.
- S. Basu, C. Riener, Bounding the equivariant Betti numbers of symmetric semi-algebraic sets, **Advances in Mathematics** 305, 803–855, 2017.
- C. Riener, T. Theobald, L. Jansson-Andrén, J.B. Lasserre, Exploiting symmetries in SDP-relaxations for polynomial optimization, **Mathematics of Operations Research** 38 (1), 122–141, 2013.
- C. Riener, On the degree and half-degree principle for symmetric polynomials, **Journal of Pure and Applied Algebra** 216 (4), 850–856, 2012.

Major contributions to the early careers of excellent researchers

I have supervised 14 students working on a master's theses, one graduate student who successfully defended his PhD thesis, and am currently supervising three PhD students. Among these students many have successfully continued their path in academia: 5 of the master students continued with doctoral studies and the mentioned PhD student is now holding a 5 years position at FAU Erlangen. Furthermore, I am currently mentoring one postdoctoral fellow (Xuan Vu) and have mentored one postdoctoral fellow before. My previous mentee (Philippe Moustrou) obtained a permanent position (Maitre de conférences at University of Toulouse III).

Organization of scientific events (selection)

2023 ISSAC (**I**nternational **S**ymposium on **S**ymbolic and **A**lgebraic **C**omputation) 2023 in Tromsø (chair local organization)

2022 Norwegian National Mathematicians meeting in Tromsø (co-organizer)

2022 14. Nordic Combinatorial Conference Tromsø (co-organizer)

2022 Mørketidens Mattemøte at UiT Tromsø* (main organizer)

2021 MFO-RIMS Tandem Workshop: Symmetries on Polynomial Ideals and Varieties (co-organizer)

2021 MEGA (**E**ffective **M**ethods in **A**lgebraic **G**eometry) conference (chair local organization)

2021 Organizer of a mini-symposium at the biannual Conference on Applied Algebraic Geometry 2021

2021 Mørketidens Mattemøte at UiT Tromsø (main organizer)

2020 Summer school: Mathematics of Data at UiT (postponed due to Covid19)

2020 Nordfjordeid summer school: Real Algebraic Geometry, Algorithms and Applications (postponed due to Covid19)

2020 Symmetry, Randomness and Computations (ICERM workshop, co-organizer)

2020 Mørketidens Mattemøte at UiT Tromsø (main organizer)

2019 Organizer of mini-symposia at the Conference on Applied Algebraic Geometry 2019

2019 Arctic Applied Algebra conference (chair local organization)

2019 Mørketidens Mattemøte at UiT Tromsø (main organizer)

2018 Summer school on algebraic statistics at UiT Tromsø (main organizer)

2018 Session organizer at the 23rd International Symposium on Mathematical Programming

2014 Session organizer at IFORS Barcelona

2013–21 Organizer of a mini-symposia at the SIAM Conferences on Applied Algebraic Geometry

2014 Applications of Real Algebraic Geometry at Aalto University (co-organizer)

2012 Mathematics, Algorithms and Proof 2012 at University of Konstanz (co-organizer)

* Yearly meeting for Scandinavian Mathematicians in Tromsø during the "Mørketid" – the dark time from November until January