

# Nils Sturma

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<https://nilssturma.github.io/>

## Education

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- 04/2021 - 09/2024 **Ph.D. in Mathematical Statistics**  
Technical University of Munich (TUM), Germany  
Advisor: Prof. Mathias Drton  
Thesis: Identifiability and Statistical Inference in Latent Variable Modeling  
Grade: summa cum laude; date of defense: September 24, 2024.
- 09/2022 - 12/2022 **Research stay at MIT/ Broad Institute in Cambridge, USA**  
Prof. Caroline Uhler  
Project: Unpaired Multi-Domain Causal Representation Learning
- 10/2018 - 01/2021 **Master in Mathematical Finance and Actuarial Science**  
Technical University of Munich (TUM), Germany  
Thesis: Testing Algebraic Constraints on Statistical Parameters  
Final grade: 1.2, with distinction (scale: 1 best, 6 worst)
- 02/2020 - 07/2020 **Semester abroad at University of Melbourne, Australia**
- 10/2014 - 01/2018 **Bachelor in Mathematics**  
Albert-Ludwigs-University of Freiburg, Germany  
Thesis: Formal Group Laws  
Minor: Management; Final grade: 1.1 (scale: 1 best, 6 worst)
- 09/2016 - 02/2017 **Semester abroad at Universidad de Sevilla, Spain**

## Academic Employment

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- 10/2024 - 08/2025 **Postdoctoral Researcher at Technical University of Munich**  
Research group Mathematical Statistics (Prof. Mathias Drton)  
Topics: Graphical Models, Causality, Algebraic Statistics, High-dim. Statistics
- Starting 09/2025 **Postdoctoral Researcher at EPFL**  
Working with Mats Stensrud and Victor Panaretos

## Publications and Preprints

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- 1 **Nils Sturma**, Miriam Kranzlmüller, Irem Portakal, Mathias Drton. Matching Criterion for Identifiability in Sparse Factor Analysis. *Submitted*, <http://arxiv.org/abs/2502.02986>.

- 2 Dennis Leung, **Nils Sturma**. Singularity-Agnostic Incomplete U-statistics for Testing Polynomial Constraints in Gaussian Covariance Matrices. *Submitted*, <https://arxiv.org/abs/2401.02112>.
- 3 Mathias Drton, Alexandros Grosdos, Irem Portakal, **Nils Sturma\***. Algebraic Sparse Factor Analysis. *SIAM Journal on Applied Algebra and Geometry*, 2025, Vol. 9, No. 2, 279-309.
- 4 Yulia Alexandr, Jane Coons, **Nils Sturma\***. Mixtures of Discrete Decomposable Graphical Models. *Algebraic Statistics*, 2024, Vol. 15, No. 2, 269-293.
- 5 **Nils Sturma**, Mathias Drton, Dennis Leung. Testing Many Constraints in Possibly Irregular Models Using Incomplete U-Statistics. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 2024, Vol. 86, No. 4, 987-1012.
- 6 **Nils Sturma**, Chandler Squires, Mathias Drton, Caroline Uhler. Unpaired Multi-Domain Causal Representation Learning. *Advances in Neural Information Processing Systems 36, NeurIPS 2023, Spotlight*.
- 7 Rina Foygel Barber, Mathias Drton, **Nils Sturma\***, Luca Weihs. Half-Trek Criterion for Identifiability of Latent Variable Models. *Annals of Statistics*, 2022, Vol. 50, No. 6, 3174-3196.

\* Shared first authorship/ alphabetical order of the authors.

## Awards/ Fellowships

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SIAM Student Travel Award	Competitive travel award for the 2023 SIAM Conference on Applied Algebraic Geometry.
MDSI/Linde PhD Fellowship	Competitive grant awarded to PhD students at TUM working on topics related to data science. The grant consists of living expenses.
Alumni-prize 2018	Every year the prize is awarded by Alumni Freiburg e.V. to the two most outstanding theses (Bachelor or Master) at the Faculty of Mathematics at the University of Freiburg.

## Teaching Experience

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Lectures	<b>Instructor for Exercise Classes</b> Graphical Models at TUM, summer term 2025. High-dimensional Statistics at TUM, summer term 2024. Linear Algebra 2 at University of Freiburg, summer terms 2016 and 2017. <b>Substitute Lecturer</b> One lecture of the master course High-dimensional Statistics at TUM, summer term 2024. Two lectures of the master course Graphical Models at TUM, summer term 2023.
Seminars	<b>Master Seminars</b>

Advances in Statistical Inference at TUM, winter term 2024/2025.

Mentoring	<b>Jannis Friebe, Master thesis, 2025</b>
	“Optimal M-estimation in Linear Non-Gaussian Models”
	<b>Daniels Birmans, Bachelor thesis, 2025</b>
	“Wald Tests of Hypotheses with Singularities”
	<b>Mingyi Guo, Master thesis, 2025</b>
	“Half-Trek Estimators in Linear Structural Equation Models”
	<b>Carolina Kornitzer, Bachelor thesis, 2025</b>
	“Dimension of Sparse Factor Analysis Models”
	<b>Miriam Kranzlmüller, Interdisciplinary Project, 2024</b>
	“Identifiability in Sparse Factor Analysis”
Upskilling	<b>Javier Yraola Meins, Bachelor thesis, 2023</b>
	“Divergence of Maximum Likelihood Estimation in Structural Equation Models”
	<b>Moritz Ebert, Master thesis, 2023</b>
	“Causal Structure Learning for Renewable Energy Time Series Data”
	<b>Julian Rittmaier, Bachelor thesis, 2022</b>
	“Identifiability of Linear Structural Equation Models with Equiconfounded Variables”
	<b>“ProLehre” Onboarding Course offered by TUM</b>
	Designed to prepare instructors for their teaching task.
	Elective Module: Supervising Students’ Theses.

## Professional Activities

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- Reviewer for Annals of Statistics, Biometrika, Electronic Journal of Statistics, Journal of Machine Learning Research, Bernoulli, Algebraic Statistics, La Matematica, CLeaR conference.
- Part of the organizing committee for the 2025 *CLeaR conference*.
- Co-organizer of the Workshop *Causal Inference for Time Series Data* at UAI 2024.
- Co-organizer of the *European Workshop on Algebraic Statistics and Graphical Models* 2024.
- Co-organizer of the minisymposium *Algebraic Methods in Graphical Models* at the SIAM Conference on Applied Algebraic Geometry 2023.

## Talks & Presentations

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02/2025	Statistics Seminar at University College Dublin, Ireland. Invited talk on <i>Identifiability in Sparse Factor Analysis</i> .
08/2024	Bernoulli-IMS World Congress in Probability and Statistics, Bochum, Germany. Invited talk on <i>Identifiability in Sparse Factor Analysis</i> .

03/2024	Statistics Seminar at University of Melbourne, Australia. Invited talk on <i>Identifiability in Sparse Factor Analysis</i> .
12/2023	NeurIPS, New Orleans, USA. Poster presentation on <i>Unpaired Multi-Domain Causal Representation Learning</i> .
07/2023	SIAM Conference on Applied Algebraic Geometry, Eindhoven, Netherlands. Contributed talk on <i>Introduction to Algebraic Methods in Graphical Models</i> .
04/2023	Workshop on Causal Representation Learning, Tübingen, Germany. Contributed talk on <i>Unpaired Multi-Domain Causal Representation Learning</i> .
03/2023	YES Causal Inference Workshop, Eindhoven, Netherlands. Poster presentation on <i>Parameter Identifiability in Latent Variable Models</i> .
03/2023	German Probability and Statistics Days, Essen, Germany. Contributed talk on <i>Testing Many and Possibly Singular Polynomial Constraints</i> .
08/2022	17. Doktorand:innentreffen der Stochastik, Klagenfurt, Austria. Contributed talk on <i>Half-Trek Criterion for Identifiability of Latent Variable Models</i> .
06/2022	IMS Annual Meeting in Probability and Statistics, London, UK. Contributed talk on <i>Half-Trek Criterion for Identifiability of Latent Variable Models</i> .

## Industry Experience

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09/2018 - 02/2021	<b>Part-time internship in the Data Analytics department at Zeppelin</b> Development of machine learning applications for the construction industry. Focus on prediction.
04/2019 - 08/2019	<b>BMW &amp; TUM Data Innovation Lab (project)</b> Deep Learning approach to predict lane changes using vehicle sensor data.
01/2017 - 03/2021	<b>Freelancer at Ernst-Klett-Verlag</b> Proofreading of mathematical school books.
02/2018 - 07/2018	<b>Internship at BMW</b> Controlling: inner-year targets of entire BMW Group.