

**Address:**

Department of Mathematics  
 Technical University of Munich  
 Boltzmannstr. 3  
 85748 Garching b. München, Germany

**Employment:**

2019–	Technical University of Munich	Professor of Mathematical Statistics
2019–	University of Washington	Affiliate Professor of Statistics
2018–2019	University of Copenhagen	Professor of Statistics
2012–2019	University of Washington	Professor of Statistics
2011–2012	The University of Chicago	Professor of Statistics
2009–2011	The University of Chicago	Associate Professor of Statistics
2005–2009	The University of Chicago	Assistant Professor of Statistics
2004–2005	University of California, Berkeley	Postdoc

**Visiting Positions:**

2017	Institute of Statistical Mathematics, Tokyo, Japan (3 months)
2007	University of Minnesota, Institute for Mathematics and its Applications (3 months)

**Education:**

2001–2004	University of Washington (Advisors: Michael D. Perlman, Thomas S. Richardson)	Ph.D. in Statistics
1994–2000	Universität Augsburg, Germany (Advisor: Friedrich Pukelsheim)	Diplom in Applied Mathematics
1998–1999	Université Toulouse III Paul Sabatier, France (Advisor: Jean-Marc Azaïs)	DEA in Applied Mathematics

**Honors:**

2021	ELLIS Fellow, European Lab for Learning & Intelligent Systems Unit Munich
2020	ERC Advanced Grant, European Research Council
2020	Elected Member, International Statistical Institute
2019	Ethel Newbold Prize, Bernoulli Society
2018	Elected Foreign Member of the Royal Danish Academy of Sciences and Letters
2016	Fellow of the Institute of Mathematical Statistics (IMS)
2014	Medallion Lecture, Institute of Mathematical Statistics (IMS)
2014	Best paper award, Bayesian Analysis
2004	Best Student Paper Award, Conference on Uncertainty in Artificial Intelligence

2003 Birnbaum Award, Department of Statistics, University of Washington.

### Grants:

2020–2025 ERC Advanced grant, “Graphical Models for Complex Multivariate Data”  
2017–2020 NSF grant, “Identification and Statistical Inference in Graphical Models”  
2016–2020 NSF grant, “Statistical Methods for Differential Network Biology With Applications to Aging”, Co-PI with A. Shojaie, D. Promislow  
2013–2016 NSF grant, “Bayesian Information Criteria and Problems of Parameter Identifiability”  
2014–2015 NSA grant, “Bayesian Information Criteria”  
2013–2014 Royalty Research Fund grant, University of Washington  
2009–2013 Sloan Research Fellowship  
2008–2013 NSF CAREER grant, “Statistical Inference in Algebraic Models with Singularities”  
2005–2008 NSF grant, “Graphical and Algebraic Models for Multivariate Categorical Data”

### Editorial Activities:

2019– Advisory board for the new journal *Algebraic Statistics*  
2018– Associate editor, *Biometrika*  
2012– Associate editor, *Electronic Journal of Statistics*  
2007–2015 Associate editor, *Annals of Statistics*  
2007–2011 Associate editor, *Journal of the Royal Statistical Society Series B*  
2013–2015 Guest editor, Special Issue on Statistics, *Linear Algebra and Its Applications*  
2007 Guest editor, Issue on “Algebraic Statistics and Computational Biology,” *Statistica Sinica*  
2007–2021 Editorial board, *Metrika*  
2004– Referee for most major Statistics journals

### Other Professional Activities:

2021–2027 Core Member, Munich Data Science Institute (MDSI)  
2021 Member, European Regional Committee, Bernoulli Society  
Member, Organizing committee, SIAM Conference on Applied Algebraic Geometry  
Member, Program committee, International Conf. on Artificial Intelligence and Statistics  
Member, Senior program committee, Conf. on Uncertainty in Artificial Intelligence  
Organizer, Invited session on Graphical Causal Models at ISI World Congress  
2020– Co-organizer, Algebraic Statistics Online Seminar  
2020 Member, Senior program committee, Conf. on Uncertainty in Artificial Intelligence  
Organizer, Workshop on Algebraic Statistics, Math. Forschungsinstitut Oberwolfach  
Member, Program Committee, Workshop on Algebraic Statistics, University of Hawaii  
2018–2019 Chair, Committee to Select Editors, Institute of Mathematical Statistics  
2017–2019 Member, Council of the Institute of Mathematical Statistics

2017–2018	Member, Committee to Select Editors, Institute of Mathematical Statistics Member, Advisory board for Mathematics Research Communities Program, American Mathematical Society
2017–2018	Member, Program Committee, IMS Annual Meeting 2018
2017	Organizer, Workshop on Algebraic Statistics, Math. Forschungsinstitut Oberwolfach
2016	Organizer, AMS Math Research Communities on Algebraic Statistics, Snowbird, UT
2013	Organizer, Invited session on Singular Learning Theory, SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO
2012	Program Chair of the Institute of Mathematical Statistics for the 2012 WNAR Conference
2011	Organizer, Invited session on Graphical Statistical Models, SIAM Conference on Applied Algebraic Geometry, Raleigh, NC
2010–2011	Chair, Committee on Special Lectures, Institute of Mathematical Statistics
2010	Co-organizer, Workshop on Parameter Identification in Graphical Models, American Institute of Mathematics, Palo Alto
2008–2010	Member, Committee on Special Lectures, Institute of Mathematical Statistics
2008	Co-organizer, Seminar on Algebraic Statistics, Math. Forschungsinstitut Oberwolfach Organizing committee member, Program on Algebraic Methods in Systems Biology and Statistics, Statistical and Applied Mathematical Sciences Institute (SAMSI)
2007	Organizer, Invited session on Graphical Models, Annual Meeting of the Western North American Region (WNAR) of the International Biometric Society
2004–2009	Member, Program committee, Conf. on Uncertainty in Artificial Intelligence

### Ph.D. Students:

2020	Shiqing Yu	Non-Gaussian graphical models: Estimation with score matching and causal discovery under zero-inflation (co-advised with Ali Shojaie)
2018	Amit Meir	Estimation and testing following model selection
	Y. Samuel Wang	Linear structural equation models with non-Gaussian errors: Estimation and discovery
	Luca Weihs	Parameter identification and assessment of independence in multivariate statistical modeling
	Chaoyu Yu	Adaptive statistical inference procedures for multigroup data (co-advised with Peter Hoff)
2017	Lina Lin	Methods for estimation and inference for high-dimensional models (co-advised with Ali Shojaie)
2016	Dennis Leung	Testing independence in high dimensions and identifiability of graphical models
	Andrew McDavid	Statistical hurdle models for single cell gene expression: Differential expression and graphical modeling (co-advised with Raphael Gottardo)
2014	Chris Fox	Interpretation and inference of linear structural equation models
2012	Rina Foygel	Prediction and model selection for high-dimensional data with sparse or low-rank structure (co-advised with Nati Srebro)
	Han Xiao	Simultaneous inference on sample covariances (co-advised with Wei-Biao Wu)

2010 Michael Finegold Robust network inference with multivariate  $t$ -distributions

Current supervision: Wenyu Chen, Philipp Dettling, Jun Wu, David Strieder,  
Konstantin Göbler, Nils Sturma

### Conference and Workshop Presentations:

- 2021 Lecture at the Mathematics in the Sciences Day, MPI MiS Leipzig  
Workshop on High Dimensionality and Data Analysis, Hausdorff Center for Mathematics, Bonn  
Ethel Newbold Award lecture at the ISI World Statistics Congress (virtual)  
Conference on Uncertainty in Artificial Intelligence (UAI2021, virtual)  
MHC2021 Workshop on Mixtures, Hidden Markov Models, and Clustering, Paris (virtual)  
Keynote speaker at the 8th Channel Network Conference of the French, Belgian, British and Irish and Dutch Biometric Societies (virtual).
- 2020 International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2020, virtual)  
Conference on Uncertainty in Artificial Intelligence (UAI2020, virtual)  
TUM ICL Mathematics Workshop, TU Munich
- 2019 Workshop on Foundations and New Horizons for Causal Inference, Oberwolfach, Germany  
Workshop on Graphical Models: Conditional Independence and Algebraic Structures, TU Munich  
Opening Conference on Varieties, Polyhedra, Computation, FU Berlin
- 2018 IMS Annual Meeting, Vilnius, Lithuania  
Workshop on Statistics in Complex Systems, Copenhagen, Denmark
- 2017 Workshop on Mathematical Methods of Modern Statistics, CIRM, Luminy, France  
Working Group on Model-Based Clustering, Perugia, Italy  
SIAM Conference on Applied Algebraic Geometry, Atlanta, GA  
Workshop on Graphical Models, Institute of Statistical Mathematics, Tokyo, Japan  
Workshop on Algebraic and Geometric Methods in Statistics, Institute of Statistical Mathematics, Tokyo, Japan
- 2016 Royal Statistical Society, Read Paper, London, UK  
Workshop on Computationally and Statistically Efficient Inference for Complex Large-scale Data, Oberwolfach, Germany  
Celebration of 60th Year of the University of Chicago's Department of Statistics
- 2015 Mathematical Society of Japan Seasonal Institute, Osaka  
Working Group on Model-Based Clustering, Seattle
- 2014 Joint Statistical Meetings, Boston  
Prague Stochastics, Czech Republic  
Abel Symposium on Statistical Analysis for High-Dimensional Data, Norway  
World Meeting of International Society for Bayesian Analysis (ISBA), Cancun, Mexico
- 2013 Joint Statistical Meetings, Montreal, Canada  
SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO

- Working Group on Model-Based Clustering, Bologna, Italy  
 UW-Microsoft Research Machine Learning Day, Seattle
- 2012 NIPS 2012 (Neural Information Processing Systems), Lake Tahoe  
 Algebraic Statistics in the Alleghenies, Penn State University  
 NSF Workshop on High-Dimensional Data, Yale University  
 Midwest Statistics Research Colloquium, University of Wisconsin, Madison  
 Statistics Winter Workshop, University of Florida
- 2011 Workshop on Singular Learning Theory, American Institute of Mathematics (AIM), Palo Alto  
 SIAM Conference on Applied Algebraic Geometry, Raleigh, NC  
 ISI World Statistics Congress, Dublin, Ireland  
 Humboldt Kolleg, Gothenburg, Sweden  
 International Indian Statistical Association Conference, Raleigh, NC  
 Workshop on Solving Polynomial Equations, Stockholm, Sweden
- 2010 Lecturer at 3<sup>e</sup> cycle romand de statistique et de probabilités appliquées (3 lectures), Switzerland  
 Special session on Applications of Algebraic Geometry, AMS Joint Math Meetings, San Francisco  
 NIPS 2010 (Neural Information Processing Systems), Vancouver  
 DREAM 5 (Dialogue for Reverse Engineering Assessments and Methods), New York
- 2008 Opening workshop, Program on Algebraic Methods in Systems Biology and Statistics, Statistical and Applied Mathematical Sciences Institute, NC  
 COMPSTAT 2008, Porto, Portugal  
 Workshop on Methods for Analyzing Longitudinal Data, Gothenburg, Sweden  
 7th World Congress in Probability and Statistics, Singapore  
 Symposium on Mathematical Aspects of Graphical Models, Durham, UK
- 2007 Special session on Combinatorial Enumeration, Optimization, Geometry, and Statistics, AMS Fall Southeastern Section Meeting, Murfreesboro, TN  
 Special session on Numerical and Symbolic Techniques in Algebraic Geometry and Its Applications, AMS Fall Central Section Meeting, Chicago  
 Workshop on Theoretical Effectivity and Practical Effectivity of Groebner Bases, Research Institute for Mathematical Sciences, Kyoto, Japan  
 Workshop on Applications in Biology, Dynamics, and Statistics, Institute for Mathematics and its Applications, Minneapolis
- 2006 Bayesian Focus Week, Statistical and Applied Mathematical Sciences Institute, NC  
 Prague Stochastics, Czech Republic  
 Annual Meeting of the Institute of Mathematical Statistics, Rio de Janeiro, Brazil  
 European Meeting of Statisticians, Torun, Poland  
 Session on Algebraic Statistics, Joint Mathematics Meetings, San Antonio
- 2005 Workshop on Algebraic Statistics and Computational Biology, Clay Mathematics Institute, Boston  
 Workshop on Multivariate Systems with Independence Structures, Gothenburg, Sweden  
 RECOMB 2015, Boston

- 2004 20th Conference on Uncertainty in Artificial Intelligence, Banff, Canada (plenary talk)  
6th Bernoulli World Congress, Barcelona, Spain  
Workshop on Algorithmic, Combinatorial and Applicable Real Algebraic Geometry, Mathematical Sciences Research Institute (MSRI), Berkeley  
Workshop on Analysis and Design of Electoral Systems, Oberwolfach, Germany
- 2003 Workshop on Computational Algebraic Statistics, American Institute of Mathematics (AIM), Palo Alto  
Workshop on Computational Aspects of Graphical Models, Aalborg, Denmark  
19th Conference on Uncertainty in Artificial Intelligence (UAI), Acapulco, Mexico  
Joint Statistical Meetings, San Francisco  
First Joint Meeting of the Institute of Mathematical Statistics and the International Society for Bayesian Analysis, Puerto Rico
- 2002 Annual Meeting of the Institute of Mathematical Statistics, Banff, Canada

### Department Seminars:

- 2021 KTH Stockholm (online), Math Machine Learning seminar MPI MiS + UCLA (online)
- 2020 Columbia University; University of Toronto, Canada (online)
- 2019 LMU Munich, Germany.
- 2018 University of Copenhagen, Denmark; Ecole Polytechnique, Paris, France.
- 2017 Stanford University; Institute of Statistical Mathematics, Japan; Keio University, Yokohama Japan; Academia Sinica, Taiwan; Booth School of Business, University of Chicago; Texas A&M
- 2016 Cornell University; Duke University; University of Washington
- 2015 Princeton University; University of Kentucky
- 2013 Georgia Tech; Universität Augsburg, Germany
- 2012 Universität Wien, Austria; Universität Regensburg, Germany; University of Washington
- 2011 University of Washington; Universität Stuttgart, Germany; Universität Mannheim, Germany; University of Perugia, Italy
- 2010 University of California, Davis; University of Chicago (Business School)
- 2009 North Carolina State University (Math); Ohio State University
- 2008 University of California, Berkeley; University of Washington; University of Illinois at Chicago; Max-Planck Institute Leipzig, Germany; Research Institute for Symbolic Computation, Linz, Austria
- 2007 Northern Illinois University; Purdue University; University of Kentucky; University of Illinois at Urbana-Champaign; Université de Montréal & McGill University
- 2006 York University, Toronto; University of Wisconsin, Madison (Biostatistics)
- 2005 Universität Heidelberg, Germany; ETH Zürich, Switzerland; University of California, Berkeley (Biostatistics), University of Illinois at Chicago
- 2004 University of Pennsylvania; University of California, Davis; University of Minnesota; University of Chicago; Carnegie Mellon; University of Michigan; University of California, Irvine; Harvard University; Columbia; University of Toronto; Stanford University; University of British Columbia, Vancouver

2003 University of Washington (Electrical Engineering); Universität Augsburg, Germany  
2002 Universität Mainz, Germany; University of Washington

### Books:

- 2 Handbook of Graphical Models (with Marloes Maathuis, Steffen Lauritzen, Martin Wainwright). Chapman & Hall/CRC Handbooks of Modern Statistical Methods, 2019.
- 1 Lectures on Algebraic Statistics (with Bernd Sturmfels, Seth Sullivant). Oberwolfach Seminars, Vol. 39. Birkhäuser Verlag, Basel, 2009.

### Articles (in Journals and Edited Volumes):

- 79 On the power of Chatterjee rank correlation (with Hongjian Shi, Fang Han). *Biometrika*, to appear.
- 78 Generalized score matching for general domains (with Shiqing Yu, Ali Shojaie). *Information and Inference: A Journal of the IMA*, to appear.
- 77 Distribution-free consistent independence tests via center-outward ranks and signs (with Hongjian Shi, Fang Han). *Journal of the American Statistical Association*, to appear.
- 76 Existence and uniqueness of the Kronecker covariance MLE (with Satoshi Kuriki, Peter Hoff). *Annals of Statistics*, **49**, no. 5, (2021): 2721–2754.
- 75 CorDiffViz: an R package for visualizing multi-omics differential correlation networks (with Shiqing Yu, Daniel E. L. Promislow, Ali Shojaie). *BMC Bioinformatics*, **22**, article 486, (2021).
- 74 High dimensional independence testing with maxima of rank correlations (with Fang Han, Hongjian Shi). *Annals of Statistics*, **48**, no. 6, (2020): 3206–3227.
- 73 Nested covariance determinants and restricted trek separation in Gaussian graphical models (with Elina Robeva, Luca Weihs). *Bernoulli* **26**, no. 4, (2020): 2503–2540.
- 72 Genetic and metabolomic architecture of variation in diet restriction-mediated lifespan extension in *Drosophila* (with Kelly Jin; Kenneth A. Wilson; Jennifer N. Beck; Christopher S. Nelson; George W. Brownridge III; Benjamin R. Harrison; Danijel Djukovic; Daniel Raftery; Rachel B. Brem; Shiqing Yu; Ali Shojaie; Pankaj Kapahi; Daniel Promislow). *PLOS Genetics* **10**, no. 7, (2020): e1008835.
- 71 High-dimensional causal discovery under non-Gaussianity (with Y. Samuel Wang). *Biometrika* **107**, no. 1, (2020): 41–59.
- 70 On causal discovery with equal variance assumption (with Wenyu Chen, Y. Samuel Wang). *Biometrika* **106**, no. 4, (2019): 973–980.
- 69 Generalized score matching for non-negative data (with Shiqing Yu, Ali Shojaie). *Journal of Machine Learning Research* **20**, paper no. 76, (2019): 1–70.
- 68 Graphical models for zero-inflated single cell gene expression (with Andrew McDavid, Raphael Gottardo, Noah Simon). *Annals of Applied Statistics* **13**, no. 2, (2019): 848–873.
- 67 The maximum likelihood threshold of a path diagram (with Chris Fox, Andreas Käuffl, Guillaume Pouliot). *Annals of Statistics* **47**, no. 3, (2019): 1536–1553.
- 66 Computation of maximum likelihood estimates in cyclic structural equation models (with Chris Fox, Y. Samuel Wang). *Annals of Statistics* **47**, no. 2, (2019): 663–690.



- 65 Algebraic problems in structural equation modeling. *The 50th Anniversary of Gröbner Bases*, Advanced Studies in Pure Mathematics, Mathematical Society of Japan, (2018): 35–86.
- 64 Symmetric rank covariances: a generalised framework for nonparametric measures of dependence (with Luca Weihs, Nicolai Meinshausen). *Biometrika* **105**, no. 3, (2018): 547–562.
- 63 Robust and sparse Gaussian graphical modeling under cell-wise contamination (with Shota Katayama, Hironori Fujisawa). *Stat* **7**, no. 1, (2018): e181.
- 62 Determinantal generalizations of instrumental variables (with Luca Weihs, Bill Robinson, Emilie Dufresne, Jennifer Kenkel, Kaie Kubjas, Reginald L. McGee II, Nhan Nguyen, Elina Robeva). *Journal of Causal Inference* **6**, no. 1, (2018).
- 61 Testing independence in high dimensions with sums of squares of rank correlations (with Dennis Leung). *Annals of Statistics* **46**, no. 1, (2018): 280–307.
- 60 Empirical likelihood for linear structural equation models with dependent errors (with Y. Samuel Wang). *Stat* **6**, no. 1, (2017): 434–447.
- 59 A Bayesian information criterion for singular models (with Martyn Plummer). *Journal of the Royal Statistical Society Series B* **79**, (2017): 323–380, discussion paper.
- 58 Structure learning in graphical modeling (with Marloes Maathuis). *Annual Review of Statistics and Its Application* **4**, (2017): 365–393.
- 57 Covariate-adaptive clustering of exposures for air pollution epidemiology cohorts (with Joshua Keller, Timothy Larson, Joel Kaufman, Dale Sandler, Adam Szpiro). *Annals of Applied Statistics* **11**, no. 1, (2017): 93–113.
- 56 Marginal likelihood and model selection for Gaussian latent tree and forest models (with Shaowei Lin, Luca Weihs, Piotr Zwiernik). *Bernoulli* **23**, no. 2, (2017): 1202–1232.
- 55 Large-sample theory for the Bergsma-Dassios sign covariance (with Preetam Nandy, Luca Weihs). *Electronic Journal of Statistics* **10**, no. 2, (2016): 2287–2311.
- 54 Generic identifiability of linear structural equation models by ancestor decomposition (with Luca Weihs). *Scandinavian Journal of Statistics* **43**, (2016): 1035–1045.
- 53 Estimation of high-dimensional graphical models using regularized score matching (with Lina Lin, Ali Shojaie). *Electronic Journal of Statistics* **10**, no. 1, (2016): 806–854.
- 52 Identifiability of directed Gaussian graphical models with one latent source (with Dennis Leung, Hisayuki Hara). *Electronic Journal of Statistics* **10**, no. 1, (2016): 394–422.
- 51 Order-invariant prior specification in Bayesian factor analysis (with Dennis Leung). *Statistics & Probability Letters* **111**, (2016): 60–66.
- 50 Efficient computation of the Bergsma-Dassios sign covariance (with Luca Weihs, Dennis Leung). *Computational Statistics* **31**, no. 1, (2016): 315–328.
- 49 Laplace approximation in high-dimensional Bayesian regression (with Rina Foygel Barber, Kean Ming Tan). *Statistical Analysis for High-Dimensional Data: The Abel Symposium 2014*, Springer International Publishing, Cham, (2016): pp. 15–36 .
- 48 Maximum likelihood estimates for Gaussian mixtures are transcendental (with Carlos Amendola, Bernd Sturmfels). In *Mathematical Aspects of Computer and Information Sciences. MACIS 2015*, Lecture Notes in Computer Science, vol. 9582. Springer, Cham, (2016): pp. 579–590.
- 47 Wald tests of singular hypotheses (with Han Xiao). *Bernoulli* **22**, no. 1, (2016): 38–59.

- 46 High-dimensional Ising model selection with Bayesian information criteria (with Rina Foygel Barber). *Electronic Journal of Statistics* **9**, (2015): 567–607.
- 45 Adaptive rhythm sequencing: A method for dynamic rhythm classification during CPR (with Heemun Kwok, Jason Coult, Thomas Rea, Lawrence Sherman). *Resuscitation* **91**, (2015): 26–31.
- 44 On the causal interpretation of acyclic mixed graphs under multivariate normality (with Chris Fox, Andreas Käußl). *Linear Algebra and Its Applications* **473**, (2015): 93–113.
- 43 Robust Bayesian graphical modeling using Dirichlet t-distributions (with Michael Finegold). *Bayesian Analysis* **9**, no. 3, (2014): 521–550, with discussion, rejoinder pp. 591–596.
- 42 PC algorithm for Gaussian copula graphical models (with Naftali Harris). *Journal of Machine Learning Research* **14**, (2013): 3365–3383.
- 41 Half-trek criterion for generic identifiability of linear structural equation models (with Rina Foygel, Jan Draisma). *Annals of Statistics* **40**, no. 3, (2012): 1682–1713.
- 40 Correction on “Moments of minors of Wishart matrices” (with Aldo Goia). *Annals of Statistics* **40**, no. 2, (2012): 1283–1284.
- 39 Maximum likelihood degree of variance component models (with Elizabeth Gross, Sonja Petrovic). *Electronic Journal of Statistics* **6**, (2012): 993–1016.
- 38 Wisdom of crowds for robust gene network inference (as part of the ‘DREAM5 Consortium’). *Nature Methods* **9**, (2012): 796–804.
- 37 SPIn: model selection for phylogenetic mixtures via linear invariants (with Anna Kedzierska, Roderic Guigo, and Marta Casanellas). *Molecular Biology and Evolution* **29**, no. 3, (2012): 929–937.
- 36 Global identifiability of linear structural equation models (with Rina Foygel, Seth Sullivant), *Annals of Statistics* **39**, no. 2, (2011): 865–886.
- 35 Robust graphical modeling of gene networks using classical and alternative t-distributions (with Michael Finegold). *Annals of Applied Statistics* **5**, no. 2A, (2011): 1057–1080.
- 34 Quantifying the failure of bootstrap likelihood ratio tests (with Ben Williams). *Biometrika* **98**, no. 4, (2011): 919–934.
- 33 On a parametrization of positive semidefinite matrices with zeros (with Josephine Yu), *SIAM Journal on Matrix Analysis and Applications* **31**, no. 5, (2010): 2665–2680.
- 32 A geometric interpretation of the characteristic polynomial of reflection arrangements (with Carly Klivans). *Proceedings of the American Mathematical Society* **138**, (2010): 2873–2887.
- 31 Smoothness of Gaussian conditional independence models (with Han Xiao). In *Algebraic Methods in Statistics and Probability II*, (Eds. M. Viana and H. Wynn), Contemporary Mathematics, vol. 516, Amer. Math. Soc., Providence, RI, (2010): pp. 155–177.
- 30 Finiteness of small factor analysis models (with Han Xiao). *Annals of the Institute of Statistical Mathematics* **62**, no. 4, (2010): 775–783.
- 29 Discrete chain graph models. *Bernoulli* **15**, no. 3, (2009): 736–753.
- 28 Likelihood ratio tests and singularities. *Annals of Statistics* **37**, no. 2, (2009): 979–1012.
- 27 Computing maximum likelihood estimates in recursive linear models (with Michael Eichler, Thomas S. Richardson). *Journal of Machine Learning Research* **10**, (2009): 2329–2348.

- 26 Moments of minors of Wishart matrices (with H el ene Massam, Ingram Olkin). *Annals of Statistics* **36**, no. 5, (2008): 2261–2283.
- 25 Graphical methods for efficient likelihood inference in Gaussian covariance models (with Thomas S. Richardson). *Journal of Machine Learning Research* **9**, (2008): 893–914.
- 24 Binary models for marginal independence (with Thomas S. Richardson). *Journal of the Royal Statistical Society Series B* **70**, no. 2, (2008): 287–309.
- 23 Multiple solutions to the likelihood equations in the Behrens-Fisher problem. *Statistics & Probability Letters* **78**, no. 18, (2008): 3288–3293.
- 22 A SINFul approach to Gaussian graphical model selection (with Michael D. Perlman). *Journal of Statistical Planning and Inference* **138**, no. 4, (2008): 1179–1200.
- 21 Multiple testing and error control in Gaussian graphical model selection (with Michael D. Perlman). *Statistical Science* **22**, no. 3, (2007): 430–449.
- 20 Algebraic statistical models (with Seth Sullivant). *Statistica Sinica* **17**, (2007): 1273–1297.
- 19 Algebraic factor analysis: Tetrads, pentads and beyond (with Bernd Sturmfels, Seth Sullivant). *Probability Theory and Related Fields* **138**, no. 3/4, (2007): 463–493.
- 18 Estimation of a covariance matrix with zeros (with Sanjay Chaudhuri, Thomas S. Richardson). *Biometrika* **94**, no. 1, (2007): 199–216.
- 17 A mutagenetic tree hidden Markov model for longitudinal clonal HIV sequence data (with Niko Beerenwinkel). *Biostatistics* **8**, no. 1, (2007): 53–71.
- 16 Maximum likelihood estimation in Gaussian chain graph models under the alternative Markov property (with Michael Eichler). *Scandinavian Journal of Statistics* **33**, no. 2, (2006): 247–257.
- 15 Seat excess variances of apportionment methods for proportional representation (with Udo Schwingenschl ogl). *Statistics & Probability Letters* **76**, no. 16, (2006): 1723–1730.
- 14 Computing all roots of the likelihood equations of seemingly unrelated regressions. *Journal of Symbolic Computation* **41**, no. 2, (2006): 245–254.
- 13 Conditional independence models for seemingly unrelated regressions with incomplete data (with Steen A. Andersson, Michael Perlman). *Journal of Multivariate Analysis* **97**, no. 2, (2006): 385–411.
- 12 Asymptotic seat bias formulas (with Udo Schwingenschl ogl). *Metrika* **62**, no. 1, (2005): 23–31.
- 11 Mutagenetic tree models (with Niko Beerenwinkel). In L. Pachter and B. Sturmfels, editors, *Algebraic Statistics for Computational Biology*, chapter 14. Cambridge University Press, (2005).
- 10 Ultra-conserved elements invertebrate and fly genomes (with Nick Eriksson, Garmay Leung). In L. Pachter and B. Sturmfels, editors, *Algebraic Statistics for Computational Biology*, chapter 22. Cambridge University Press, (2005).
- 9 Model selection for Gaussian concentration graphs (with Michael D. Perlman). *Biometrika* **91**, no. 3, (2004): 591–602.
- 8 Multimodality of the likelihood in the bivariate seemingly unrelated regressions model (with Thomas S. Richardson). *Biometrika* **91**, no. 2, (2004): 383–392.
- 7 Surface volumes of rounding polytopes (with Udo Schwingenschl ogl). *Linear Algebra and Its Applications* **378**, (2004): 71–91.

- 6 Seat allocation distributions and seat biases of stationary apportionment methods for proportional representation (with Udo Schwingenschlögl). *Metrika* **60**, no. 2, (2004): 191–202.
- 5 Simulation of aphasic naming performance in non-brain-damaged adults (with JoAnn Silkes, Malcolm McNeil). *Journal of Speech, Language and Hearing Research* **47**, no. 3, (2004): 610–623.
- 4 A rediscovered Llull tract and the Augsburg web edition of Llull’s electoral writings (with Günter Hägele, Dominik Haneberg, Friedrich Pukelsheim, Wolfgang Reif). *Le Médiéviste et l’Ordinateur* **43**, online, 2004.
- 3 A Markov chain model of tornadic activity (with Caren Marzban, Peter Guttorp, Joseph T. Schaefer). *Monthly Weather Review* **131**, no. 12, (2003): 2941–2953.
- 2 Seat biases of apportionment methods for proportional representation (with Karsten Schuster, Friedrich Pukelsheim, Norman R. Draper). *Electoral Studies* **22**, no. 4, (2003): 651–676.
- 1 Analyse de la variance non-équilibrée hiérarchique: comparaison de cinq logiciels (Unbalanced hierarchical analysis of variance: comparison of five software packages) (with Jean-Marc Azaïs). *Journal de la Société Française de Statistique* **140**, no. 1, (1999): 23–40.

### Conference Papers, Technical Reports & Commentaries:

- 16 Confidence in causal discovery with linear causal models (with David Strieder, Tobias Freidling, Stefan Haffner). *Proceedings of the 37th Conference on Uncertainty in Artificial Intelligence (UAI 2021)*, (2021), accepted.
- 15 Definite Non-Ancestral Relations and Structure Learning (with Wenyu Chen, Ali Shojaie). *8th Causal Inference Workshop (causalUAI 2021)*, (2021).
- 14 Statistical significance in high-dimensional linear mixed models (with Lina Lin, Ali Shojaie). *Proceedings of the 2020 ACM-IMS Conference on Foundations of Data Science (FODS ’20)*, (2020): 171–181.
- 13 Structure learning for cyclic linear causal models (with Carlos Amndola, Philipp Dettling, Federica Onori, Jun Wu). *Proceedings of the 36th Conference on Uncertainty in Artificial Intelligence*, PMLR 124, (2020): 999–1008.
- 12 Algebraic tests of general Gaussian latent tree models (with Dennis Leung). *Advances in Neural Information Processing Systems* **31**, (2018): 6298–6307.
- 11 Graphical models for non-negative data using generalized score matching (with Shiqing Yu, Ali Shojaie). *Proceedings of the Twenty-First International Conference on Artificial Intelligence and Statistics*, Proceedings of Machine Learning Research **84**, (2018): 1781–1790.
- 10 Algebraic statistics (with Thomas Kahle, Bernd Sturmfels, Caroline Uhler). *Oberwolfach Reports* **14**, (2017): 1207–1279.
- 9 Nonparametric reduced rank regression (with Rina Foygel, Michael Horrell, John Lafferty). *Advances in Neural Information Processing Systems* **25**, (2012): 1628–1636.
- 8 Comments on: Sequences of regressions and their independencies (with Chris Fox, Andreas Käuffl). *TEST* **21**, no. 2, (2012): 255–261.
- 7 Extended Bayesian information criteria for Gaussian graphical models (with Rina Foygel). *Advances in Neural Information Processing Systems* **23**, (2010): 2020–2028.

- 6 Exact block-wise optimization in group lasso for linear regression (with Rina Foygel). arXiv:stat.ML/1010:3320, (2010).
- 5 Robust graphical modeling with t-distributions (with Michael Finegold). *Proceedings of the 25th Conference on Uncertainty in Artificial Intelligence*, (2009): 169–176.
- 4 Iterative conditional fitting for discrete chain graph models. *COMPSTAT 2008—Proceedings in Computational Statistics*, (2008): 93-104.
- 3 Algebraic techniques for Gaussian models. *Prague Stochastics 2006* (Eds., Marie Huskova and Martin Janzura), (2006): 81–90.
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