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EMPLOYMENT

Research Assistant Professor August 2008-May 2011
Department of Mathematics, Statistics and Computer Science
The University of Illinois at Chicago

VISITING POSITIONS

Research Fellow January- June 2009
SAMSI (Statistical and Applied Mathematical Sciences Institute)
Algebraic statistics and evolutionary biology working groups of
the 2008-2009 Program on Algebraic Methods in Systems Biology and Statistics

Visiting Scholar January- March 2011
Institut Mittag-Leffler
Algebraic geometry with a view towards applications

EDUCATION

Ph.D., 2008, Mathematics
University of Kentucky
Advisor: Uwe Nagel
Thesis: Combinatorial invariants of toric ideals in theory and applications

M.S., 2005, Mathematics
University of Kentucky
Advisor: Uwe Nagel

B.S., 2003, Applied Mathematics, Magna Cum Laude
University of Tennessee at Chattanooga
Minor in Music Performance
Advisor: John Graef
Thesis: Oscillation of Solutions of Dynamic Equations on Time Scales –
the Sturm-Picone Comparison Theory

RESEARCH INTERESTS

Algebraic statistics, applied and computational algebraic geometry and commutative algebra,
applications to statistical models in phylogenetics and random graph models.

PUBLICATIONS

13. *Maximum likelihood estimation in network models*,
with Alessandro Rinaldo and Stephen E. Fienberg. Submitted.
12. *PHCpack in Macaulay2 – an interface*,
with Elizabeth Gross and Jan Verschelde. Submitted.
11. *Equality of Graver bases and universal Gröbner bases of colored partition identities*,
with Tristram Bogart and Raymond Hemmecke. Submitted.
10. *Algebraic Statistics*, with Aleksandra Slavkovic.
In: International Encyclopedia of Statistical Science, part 1, Lovric (ed), Springer (2011).
9. *Markov degrees of hierarchical models and Betti numbers of Stanley-Reisner ideal*,
with Erik Stokes. Submitted.
8. A sample space of k-way tables given conditionals and their relations to marginals:
Implications for cell bounds and Markov bases, with Aleksandra B. Slavkovic
and Xiaotian Zhu. Submitted (in revision).
7. *Identifiability of two-tree mixtures under group-based models*,
with Elizabeth Allman, Seth Sullivant and John Rhodes.
IEEE/ACM Transactions in Computational Biology and Bioinformatics, 8 no. 3 (2011).
6. *Algebraic statistics for a directed random graph model with reciprocation*,
with Stephen Fienberg and Alessandro Rinaldo.
AMS CONM Series Vol 516: Algebraic Methods in Statistics and Probability II, Viana
and Wynn, editors. (2010)
5. *Algebraic Statistics for $p1$ random graph models: Markov bases and their uses*,
with Stephen Fienberg and Alessandro Rinaldo.
To appear. (In S. Sinharay and N. J. Dorans, editors, Papers in Honor of Paul W. Holland.
Educational Testing Service, Springer.)
4. *Properties of cut ideals of ring graphs*, with Uwe Nagel.
Journal of Commutative Algebra, Volume 1, no. 3. (2009)
3. *Universal Groebner bases of varieties of minimal degree*.
Math Res Lett, Volume 15, no. 5-6 , 1211-1223. (2008)
2. *Toric ideals of phylogenetic invariants for the general group-based model on claw trees*, with Julia Chifman.
In: Proceedings of the Second international conference on Algebraic Biology,
(eds. H. Anai, K. Horimoto and T. Kutsia), Springer LNCS 4545. (2007)
1. *A nonlinear Sturm--Picone comparison theorem for dynamic equations on time scales*,
with Boris Belinskiy and John Graef.
International Journal of Difference Equations. (2007)

IN PREPARATION

- Minimal reductions of Ferrers ideals*, with Alberto Corso, Uwe Nagel and Cornelia Yuen.
Algebraic complexity of maximum likelihood estimation and restricted maximum likelihood for random effects model, with Mathias Drton and Elizabeth Gross.
GraphicalModels.m2: computing with graphical models, with Luis Garcia-Puente, et. al.

PROFESSIONAL ACTIVITIES

Co-organizer of a Macalay2 workshop on implementing algorithms in applied algebraic geometry
Institute of Mathematics and its Applications (IMA), July 25-29, 2011.

Co-organizer of the AMS Special Session on Computational Algebra and Convexity
Joint Mathematics Meetings, Washington DC, January 6-8, 2009.

Co-organizer of the AMS Special Session on Advances in Algebraic Statistics
AMS Sectional Meeting in Lexington, KY, March 27-28 2010.

Referee for Journal of Combinatorial Optimization, Communications in Algebra,
Journal of Software for Algebraic Geometry- Macaulay2,
Experimental Mathematics, Journal of Combinatorial Theory A, Journal of Algebra.

Associate Editor, Journal of Algebraic Statistics.

Member of the Program Committee, Algebraic and Numeric Biology, RISC Austria, 2010.

Review Editor, Frontiers in Systems Biology.

SELECTED INVITED TALKS

Existence of maximum likelihood estimators for 3 toric models Toric Geometry and Applications K.U.Leuven, Belgium	Jul 2011
Existence of MLE for a random graph model with reciprocation Combinatorial Optimization, Statistics and Applications TU Munich, Germany	Mar 2011
An example in algebraic statistics (...) Colloquium Penn State, Department of Statistics	Jan 2011
Edge subrings of hypergraphs CMS Special session on commutative algebra and combinatorics Vancouver, Canada	Dec 2010
A computational challenge in algebraic statistics AMS Special session on numerical algebraic geometry University of Notre Dame, South Bend, IN	Nov 2010
An invitation to algebraic statistics Colloquium Illinois Institute of Technology, Chicago, IL	Nov 2010
Random graph models: an example in applied algebraic geometry Algebraic Geometry Seminar Queen's University, Kingston ON, Canada	Sep 2010
Combinatorial commutative algebra in action: Markov moves from classical algebraic constructions Algebraic statistics minisymposium, SIAM annual meeting Pittsburgh, PA	Jul 2010
Identifiability of two-tree mixture models The Second CREST-SBM International Conference "Harmony of Gröbner bases and the modern industrial society" Osaka, Japan	Jun 2010

- Toric ideals in algebraic statistics
Algebraic Geometry Seminar
Barcelona, Spain May 2010
- Universal Grobner and Graver bases
Special Session on Combinatorial Commutative Algebra
Univeristy of Kentucky, Lexington, KY Mar 2010
- Algebraic Statistics of random graph models
Graduate Student Seminar
Northwestern University, Evanston IL Feb 2010
- A first connection between Betti numbers and Markov degrees
Symbolic Computation Seminar
North Carolina State University, Raleigh, NC Nov 2009
- Betti numbers of Stanley-Reisner ideals and Markov complexity
1st PRIMA Congress, special session on commutative algebra
Sydney, Australia Jul 2009
- Graver bases of rational normal scrolls
Algebra and geometry seminar
University of Kentucky, Lexington, KY May 2009
- Toric ideals in phylogenetics and beyond
Workshop on phylogenetics
Statistics and Applied Mathematical Sciences Institute (SAMSI)
Research Triangle Park, NC Apr 2009
- Algebraic statistics of p_1 random graph models
AMS Central Section meeting, special session on algebraic tools in
probability and statistics
University of Illinois, Urbana, IL Mar 2009
- Toric ideals in algebraic statistics
Second Bluegrass Algebra Conference
University of Kentucky, Lexington, KY Mar 2009
- Graver bases of varieties of minimal degree
Connections for women: algebraic geometry and related fields
Mathematical Sciences Research Institute (MSRI)
Berkeley, CA Jan 2009
- Algebraic statistics of p_1 random graph models
Workshop on Algebraic Statistical Models
Statistics and Applied Mathematical Sciences Institute (SAMSI)
Research Triangle Park, NC Jan 2009
- Algebraic statistics of p_1 random graph models
MSRI Workshop on Algebraic Statistics
Mathematical Sciences Research Institute (MSRI)
Berkeley, CA Dec 2008
- Algebraic properties of cut ideals of certain graphs.
AMS Central Section meeting, special session on combinatorial and
geometric aspects of commutative algebra.
Bloomington, IN Apr 2008
- Phylogenetic invariants: an example in algebraic statistics.
Statistics Department seminar
Carnegie Mellon University, Pittsburgh, PA Jan 2008
- Universal Gröbner bases of varieties of minimal degree
Special session on progress in commutative algebra
Joint Mathematics Meetings, San Diego Jan 2008

Algebraic properties of cut ideals AMS Eastern Section, special session on toric varieties Rutgers University, NJ	Oct 2007
Toric ideals of phylogenetic invariants for the general group-based model on claw trees Second international conference on algebraic biology Research Institute for Symbolic Computation (RISC) Linz, Austria	Jul 2007
Introduction to phylogenetics Eastern Kentucky University Symposium Richmond, KY	Mar 2007
Toric ideals of phylogenetic invariants, poster, IMA Workshop on Applications in Biology, Dynamics, and Statistics Institute for Mathematics and its Applications (IMA) Minneapolis, MN	Mar 2007

UNIVERSITY SERVICE

Microteach Leader Teaching Assistants Orientation, University of Kentucky Organizing and leading micro-teach sessions as a part of the University-wide orientation for new teaching assistants.	Aug 2006
Mathematics Department Chair Search Committee Mathematics Department, University of Kentucky Representing the graduate student body on the Chair Search Committee	Spring 2007

TEACHING EXPERIENCE

At the University of Illinois at Chicago Supervising one PhD student (since summer 2010) Advanced Topics: Algebraic Statistics (<i>graduate course</i>) Multivariable calculus Computer Algorithms (<i>graduate/undergraduate</i>)	Aug 2008 – present
At the University of Kentucky Matrix Theory and its Applications, College algebra, Research Assistant with focus on Mathematics Education.	Aug 2003 – May 2008
At the University of Tennessee at Chattanooga Development of online homework problems for various undergraduate courses. Prototype still used today.	Aug 2001 – Aug 2003

REFERENCES

Elizabeth Allman, University of Alaska Fairbanks
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Stephen E. Fienberg, Carnegie-Mellon University
fienberg@stat.cmu.edu , 412.268.2723

Uwe Nagel, University of Kentucky
uwenagel@ms.uky.edu , 859.257.6793

Frank Sottile, Texas A&M University
sottile@math.tamu.edu , 979.845.4169

Bernd Sturmfels, University of California Berkeley
bernd@math.berkeley.edu , 510.642.4687

Jan Verschelde (including teaching), University of Illinois at Chicago
jan@math.uic.edu , 312.996.4609