

## Serkan Hoşten

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### EDUCATION

**Ph.D.** August 1997 Operations Research, Cornell University, Ithaca, NY.  
**Minors:** Mathematics, Computer Science  
**M.S.** April 1995 Operations Research, Cornell University, Ithaca, NY.  
**B.S.** May 1992 Industrial Engineering, Bilkent University, Ankara, Turkey.

### DOCTORAL THESIS

**Title** “Degrees of Gröbner Bases of Integer Programs”  
**Advisor** Professor Bernd Sturmfels

### RESEARCH INTERESTS

Combinatorial commutative algebra, computational algebra, discrete geometry and combinatorics, algebraic geometry, linear and integer programming, algebraic statistics

### PROFESSIONAL EXPERIENCE

**Professor** 2010 – , 2004-2010 (Associate), 2000-2004 (Assistant)  
San Francisco State University, Mathematics Department  
**Member** Fall 2014, Simons Institute for the Theory of Computing  
Fall 2008, SAMSI Statistical and Applied Mathematical Sciences Institute  
Jan-Feb 2007, IMA Applications of Algebraic Geometry  
July 2004, IAS/PCMI Geometric Combinatorics  
Spring 2003, MSRI Commutative Algebra  
**Assistant Professor** Fall 1998– Spring 2000  
George Mason University, Mathematical Sciences Department  
**Visiting Scholar** Spring 2000, UC Berkeley, Mathematics Department  
**Postdoctoral Fellow** Fall 1998-Spring 1999  
Mathematical Sciences Research Institute, Berkeley, CA  
**Visiting Assistant Professor** Fall 1997-Spring 1998  
George Mason University, Mathematical Sciences Department

## HONORS, AWARDS, GRANTS

MAA Golden Section (NorCal, Nevada, Hawaii) Haimo Award for Distinguished Teacher of University or College Mathematics, 2016,

NSF Center for Undergraduate Research in Mathematics Minigrant, 2009-2010,  
CSUPERB Seed Grant, 2008-2009,  
SFSU Center for Computing for Life Sciences Minigrant, 2006  
SFSU Presidential Award for Professional Development, Spring 2003  
SFSU Summer Research Grant, Summer 2001 and Summer 2002  
SFSU Presidential Assigned Time, Spring 2001  
John McMullen Graduate Fellowship, 1993

## SERVICE

Program Director of SIAM Activity Group in Algebraic Geometry (2016-2017),  
Program Co-Chair of SIAM Conference on Applied Algebraic Geometry (AG17) (2016-2017),  
Associate Editor of SIAM Journal on Matrix Analysis and Applications (SIMAX), (2017-2019),  
Associate Editor of Applied Mathematics Research Express (2010-2012),

Associate Chair of SFSU Mathematics Department (Fall 2016 – ),  
Graduate Coordinator at SFSU Mathematics Department (Fall 2013-Fall 2016),  
Retention, Tenure, and Promotion Committee at SFSU Mathematics Department (2013-2015),  
Hiring Committee Member at SFSU Mathematics Department (2002-03, 2004-05, 2012-13, 2014-15, 2016-2017)

## PUBLICATIONS

### Published Articles

- 1. GRIN: An implementation of Gröbner bases for integer programming**, (with B. Sturmfels), in “Integer Programming and Combinatorial Optimization”, [E. Balas and J. Clausen, eds.] *Springer Lecture Notes in Computer Science* **920** (1995) pp. 267–276.
- 2. Gröbner bases in integer programming**, (with R. Thomas) *Optima* **48** (1995).
- 3. The polytope of all triangulations of a point configuration**, (with J. De Loera, F. Santos, B. Sturmfels), *Documenta Mathematica* **1** (1996) pp. 103-119.  
<http://www.mathematik.uni-bielefeld.de/documenta>
- 4. Gröbner bases and integer programming**, (with R. Thomas), in “Gröbner Bases and Applications”, [B. Buchberger and F. Winkler, eds.], Cambridge University Press, *London Math. Soc. Lecture Notes Series* **251** (1998) pp. 144-158.

5. **On the complexity of smooth projective toric varieties**, *Tôhoku Math. J.* **50** (1998) pp. 325-332.
6. **Computing Sagbi and Sagbi-Gröbner bases over PID's**, (with W. W. Adams, P. Lous-taunau, J. L. Miller), *Journal of Symbolic Computation* **27** (1999) pp. 31-47.
7. **The associated primes of initial ideals of lattice ideals**, (with R. Thomas), *Mathematical Research Letters* **6** (1999) pp. 83-97.
8. **The order dimension of the complete graph**, (with W. D. Morris), *Discrete Mathematics* **201** (1999) pp. 133-139.
9. **Standard pairs and group relaxations in integer programming**, (with R. Thomas), *Journal of Pure and Applied Algebra* **139** (1999) pp. 133-157.
10. **Primary decomposition of lattice basis ideals**, (with J. Shapiro), *Journal of Symbolic Computation* **29** (2000) pp. 625-639.
11. **Monomial ideals**, (with G. Smith), in “Computations in Algebraic Geometry with Macaulay 2” [D. Eisenbud, D. Grayson, M. Stillman and B. Sturmfels, eds.], Springer, *Algorithms and Computation in Mathematics* **8** (2001) pp. 73–100.
12. **Gröbner bases and polyhedral geometry of reducible and cyclic models**, (with S. Sul-livant), *Journal of Combinatorial Theory, Series A* **100** (2002) pp. 277–301.
13. **The vertex ideal of a lattice**, (with D. Maclagan), *Advances in Applied Mathematics* **29** (2002) pp. 521–538.
14. **Gomory integer programs**, (with R. Thomas), *Mathematical Programming, Ser. B* **96** (2003) pp. 271–292.
15. **Supernormal vector configurations**, (with D. Maclagan and B. Sturmfels), *Journal of Algebraic Combinatorics* (2004) **19** pp. 297–313.
16. **Ideals of adjacent minors**, (with S. Sullivant), *Journal of Algebra* **277** (2004) pp. 625–642.
17. **Computational algebra for bifurcation theory**, (with K. Gatermann), *Journal of Sym-bolic Computation* **40** (2005) pp. 1180–1207.
18. **Solving the likelihood equations**, (with A. Khetan and B. Sturmfels), *Foundations of Computational Mathematics* **5** (2005) pp. 389–407.
19. **The maximum likelihood degree**, (with F. Catanese, A. Khetan, and B. Sturmfels), *Amer-ican Journal of Mathematics* **128** (2006) pp. 671–697.
20. **Cyclotomic polytopes and growth series of cyclotomic lattices**, (with M. Beck), *Math-ematical Research Letters* **13** (2006) pp. 607–622.

- 21. Introductory notes to algebraic statistics**, (with Suela Ruffa), *Rendiconti dell'Istituto di Matematica dell'Universita di Trieste* **37** (2006) pp. 39-70.
- 22. Nice initial complexes of some classical ideals**, (with A. Conca and R. Thomas) in Proceedings of Anogia Conference on Algebraic and Geometric Combinatorics, *AMS Contemporary Mathematics* **423** (2006) pp. 11–42.
- 23. A finiteness theorem for Markov bases of hierarchical models**, (with S. Sullivant), *Journal of Combinatorial Theory, Series A* **114** (2007) pp. 311–321.
- 24. Counting and locating the solutions of polynomial systems of maximum likelihood equations, II: The Behrens-Fisher problem**, (with M. Buot and D. P. Richards), *Statistica Sinica* **17** (2007) pp. 1343–1354.
- 25. A survey of toric initial ideals**, *Ramanujan Mathematical Society Lecture Notes Series 4* (2007) pp. 39–90.
- 26. Computing the integer programming gap**, (with B. Sturmfels), *Combinatorica* **27** (2007) pp. 367–382.
- 27. Normal toric ideals of low codimension**, (with P. Dueck and B. Sturmfels), *Journal of Pure and Applied Algebra*, **213** (2009) pp. 1636–1641.
- 28. The algebraic complexity of maximum likelihood estimation for bivariate missing data**, (with S. Sullivant) in *Algebraic and Geometric Methods in Statistics*, pp. 123–133, Cambridge University Press, 2010.
- 29. Root polytopes and growth series of root lattices**, (with F. Ardila, M. Beck, J. Pfeifle, and K. Seashore), *SIAM Journal of Discrete Mathematics* **25** (2011) pp. 360–378.
- 30. Least squares methods for equidistant tree reconstruction**, (with C. Fahey, N. Krieger, and L. Timpe), [arXiv:0808.3979](https://arxiv.org/abs/0808.3979).
- 31. Uncovering proximity of chromosome territories using classical algebraic statistics**, (with J. Arsuaga, I. Heskia, and T. Maskalevich), *Journal of Algebraic Statistics* **6** (2015) pp. 133–149.
- 32. The maximum likelihood degree of toric varieties**, (with C. Amendola, N. Bliss, I. Burke, C. Gibbons, M. Helmer, E. Nash, J. Rodriguez, and D. Smolkin), [arXiv:1703.02251](https://arxiv.org/abs/1703.02251).

### Volumes Edited

- 1. Symbolic Computation: solving equations in algebra, geometry and engineering**, (with E. Green, R. Laubenbacher and V. Powers), *AMS Contemporary Mathematics* **286** (2001).
- 2. Trends in Optimization**, (with J. Lee and R. Thomas), *AMS Proceedings of Symposia in Applied Mathematics* **61** (2004), Providence.

**3. Computational Algebraic Statistics**, (with C. Meek) Special Issue of *Journal of Symbolic Computation* **41** (2006) pp. 123–254.

## **PROFESSIONAL ACTIVITIES**

### **Conference Organization**

- “Mid-Atlantic Algebra Days”, 18-19 March 2000, GMU, (with K. Fischer and J. Shapiro).
- “Symbolic Computation: solving systems in algebra, geometry and engineering”, 11-16 June 2000, AMS-SIAM-IMA Joint Research Conference, Mount Holyoke College, (with E. Green, R. Laubenbacher and V. Powers).
- “Second Bay Area Discrete Mathematics Day”, 14 April 2001, San Francisco State University, San Francisco, CA, (with J. De Loera, T. Roby and B. Sturmfels).
- “Computational Algebraic Geometry and Its Applications”, 28-29 April 2001, Special Session at 2001 Spring Eastern Section Meeting of AMS, Hoboken, NJ (with F. Sottile).
- “Symbolic Computational Algebra 2002” 15-19 July 2002, ORCCA, University of Western Ontario, London, Ontario, Canada, (with R. Corless, E. Green, R. Laubenbacher, V. Powers, and G. Reid).
- “Combinatorics and Integer Programming of Multidimensional Tables”, 17-20 November 2002, Invited Session at INFORMS, San Jose, CA.
- “Workshop on Computational Commutative Algebra”, 13-15 March 2003, Mathematical Sciences Research Institute, Berkeley, CA, (with C. Huneke, B. Sturmfels, and I. Swanson).
- “Combinatorial Commutative Algebra and Algebraic Geometry”, 3-4 May 2003, Special Session at 2003 Spring Western Section Meeting of AMS, San Francisco, CA (with E. Miller).
- “Seventh Bay Area Discrete Mathematics Day”, 18 October 2003, San Francisco State University, San Francisco, CA, (with J. Gubeladze).
- “Computational Algebraic Statistics” 14-18 December 2003, American Institute of Mathematics, Palo Alto, CA, (with J. De Loera, S. Fienberg, A. Karr, and B. Sturmfels).
- “AMS Shortcourse on Discrete Optimization”, 5-6 January 2004, Phoenix, AZ, (with J. Lee and R. Thomas).
- “NSF-CBMS Regional Conference: Algebraic Combinatorics of Partially Ordered Sets”, 8-12 August 2005, San Francisco State University, San Francisco, CA, (with J. Gubeladze).
- “First Biology and Mathematics Day in the Bay Area”, 3 December 2005, San Francisco State University, San Francisco, CA, (with J. Arsuaga, B. Sturmfels, and M. Vazquez).
- “Homological and K-Theoretical Trends in Algebraic Combinatorics”, 29-30 April 2006, Special Session at 2006 Spring Western Section Meeting of AMS, San Francisco, CA (with J. Gubeladze).
- “Applications in Biology, Dynamics, and Statistics”, January-March 2007, in *IMA Special Thematic Year on Applications of Algebraic Geometry*.
- “Algebraic Methods in Systems Biology and Statistics”, 2008-2009 *SAMSI* Research Program.
- AMS Mathematics Research Community on “Algebraic Statistics”, June 11-18, 2016, Snowbird, Utah (with M. Drton, E. Gross, D. Kahle, and S. Petrovic).
- SIAM Conference on Applied Algebraic Geometry, July 31-August 4, 2017, Georgia Tech, Atlanta, Georgia (co-chair with David Cox).

## **THESIS STUDENTS**

- Domenico Napoletani, Mathematics, George Mason University, *Exponential Geometry*, 1999.
- Jon Freedman, Mathematics, SFSU, *Algorithms for Standard Pair Decomposition of Monomial*

*Ideals*, Spring 2001.

- Benjamin Owens, Mathematics, SFSU, *Gröbner Bases of Toric Ideals of Matroids*, Spring 2002.
- Seth Sullivant, Mathematics, SFSU, *Toric Ideals of Graphical Models in Statistics*, Spring 2002.
- Ian Sammis, Mathematics, SFSU, *0/1 Contingency Tables and Hierarchical Models*, Spring 2003.
- Alex Milowski, Mathematics, SFSU. *Computing Irredundant Irreducible Decompositions and Scarf Complexes of Large Scale Monomial Ideals*, Spring 2004.
- Leslie Timpe, Mathematics, SFSU, *Tropical Geometry and Construction of Phylogenetic Trees*, Spring 2006.
- Kim Seashore, Mathematics, SFSU, *Using Polytopes to Derive Growth Series for Classical Root Lattices*, Summer 2007.
- Bill Storti, Mathematics, SFSU, *Improving Response Times at SFFD*, Fall 2007.
- Ido Heskia, Mathematics, SFSU, *Chromosome Clustering and Algebraic Statistics*, Spring 2010.
- Ralf Youtz, Mathematics, SFSU, *Toric Ideals of Small Matroids Are Generated in Degree 2*, Spring 2010.
- Eric Miranda, Mathematics, SFSU, *Graph Operations in Tropical Geometry*, Spring 2010.
- Jonathan Terhorst, Mathematics, SFSU, *The Kalmanson Complex*, Spring 2011.
- Tatsiana Maskalevich, Mathematics, SFSU, *Testing Chromosome Proximity Hypothesis Using Log-Linear Models*, Spring 2011.
- Ashley Shimabuku, Mathematics, SFSU, *Cohen-Macaulayness of Initial Ideals of Normal Toric Ideals*, Spring 2011.
- Addie Evans, Mathematics, SFSU, *Phylogenetic Inference via Algebraic Statistics*, Fall 2011.
- Dennis Schlieff, Mathematics, SFSU, *Degree of Central Curve in Quadratic Programming*, Summer 2014.
- Matthew Simms, Mathematics, SFSU, *Building a 3D Yeast Genome Map Using 4C and LP Methods*, Fall 2014.
- Daniel Lemke, Mathematics, SFSU, *Maximum Likelihood Estimation and EM Fixed Point Ideals for Binary Tensors*, Spring 2016.
- Jose Tanquillut, Mathematics, SFSU, *Certifying the Existence of Partially Calibrated Epipolar Matrices and Trifocal Tensors*, Spring 2016.
- Joshua Rhodes, Mathematics, SFSU, *Computing the Central Sheet in Linear, Quadratic, and Semidefinite Programs*, Summer 2016.
- Radoslav Vuchkov, Mathematics, SFSU, *Maximum Likelihood Degree of Various Toric Varieties*, Summer 2016.