Jeff Sommars

CONTACT INFORMATION

Mathematics, Statistics and Computer Science
University of Illinois at Chicago
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EDUCATION

University of Illinois at Chicago, Chicago, IL

Ph.D. in Mathematics, Fall 2013–Spring 2018 (expected)
Advisor: Jan Verschelde
Thesis: Algorithms and Implementations in Computational Algebraic Geometry

Wheaton College, Wheaton, IL

M.A.T. in Teaching Mathematics, Fall 2011–Spring 2013
Advisor: Laura Barwegen
Thesis: The Effects of the BRIDGE Program on At-Risk Student Achievement

Wheaton College, Wheaton, IL

B.S. in Mathematics, magna cum laude, Fall 2008–Summer 2011
President's Award recipient

WORK EXPERIENCE

First Trust Portfolios L.P., Wheaton, IL

Software Developer/Research Analyst, 2014-present

PUBLICATIONS

Computing Tropical Prevarieties in Parallel. With Anders Jensen and Jan Verschelde. In PASCO 2017, Proceedings of the 8th International Workshop on Parallel Symbolic Computation, edited by H.-W. Loidl, M. Monagan, J.-C Faugère, ACM, 2017.

Pruning Algorithms for Pretropisms of Newton Polytopes. With Jan Verschelde. In the Proceedings of the 18th International Workshop on Computer Algebra in Scientific Computing (CASC 2016), edited by V.P. Gerdt, W. Koepf, W.M. Seiler, and E.V. Vorozhtsov, volume 9890 of Lecture Notes in Computer Science, pages 489-503, Springer-Verlag, 2016.

Computing Pretropisms for the Cyclic n-Roots Problem. With Jan Verschelde. In EuroCG 2016, 32nd European Workshop on Computational Geometry, Lugano, Switzerland, March 30–April 1, 2016, pages 235-238.

Solving Polynomial Systems in the Cloud with Polynomial Homotopy Continuation. With Nathan Bliss, Jan Verschelde and Xiangcheng Yu. In the Proceedings of the 17th International Workshop on Computer Algebra in Scientific Computing (CASC 2015), edited by V.P. Gerdt, W. Koepf, W.M. Seiler, and E.V. Vorozhtsov, volume 9301 of Lecture Notes in Computer Science, pages 87-100, Springer-Verlag, 2015.

Strong Divisibility, Cyclotomic Polynomials, and Iterated Polynomials. With Nathan Bliss, Ben Fulan and Stephen Lovett. In The American Mathematical Monthly, Volume 120, Issue 6, pages 519-536.

Under Review

Solving Polynomial Systems via Homotopy Continuation and Monodromy. With Timothy Duff, Cvetelina Hill, Anders Jensen, Kisun Lee and Anton Leykin. arxiv:1609.08722

*A Computer Algebra System for R: Macaulay2 and the **m2r** Package.* With David Kahle and Chris O'Neill. arxiv:1706.07797

Computing Tropical Varieties in Macaulay2. With Carlos Amèndola, Kathlèn Kohn, Sara Lamboglia, Diane Maclagan, Ben Smith, Paolo Tripoli and Magdalena Zajaczkowska. arxiv:1710.10651

Talks

Dec 2017. *Algorithms and Software for Computing Tropical Prevarities.* MPI Leipzig Nonlinear Algebra Seminar. Leipzig, Germany.

Aug 2017. *Solving Polynomial Systems via Homotopy Continuation and Monodromy.* Aarhus University Algebra Seminar. Aarhus, Denmark.

Aug 2017. *A Dynamic Enumeration Approach for Computing Tropical Prevarieties.* SIAM Conference on Applied Algebraic Geometry. Atlanta, GA.

May 2017. *Algorithms for Computing Tropical Prevarieties.* Texas A&M Algebra Seminar. College Station, TX.

Apr 2017. *Solving Polynomial Systems via Homotopy Continuation and Monodromy.* Chicago Area SIAM Student Conference. Evanston, IL.

Apr 2017. *Solving Polynomial Systems via Numerical Methods.* Numerical Linear Algebra Group at Purdue University. West Lafayette, IN.

Jan 2017. *m2r: A Computer Algebra System for R.* Joint Mathematics Meetings AMS Algebraic Statistics Special Session. Atlanta, GA.

Sep 2016. *Pruning Algorithms for Pretropisms of Newton Polytopes.* Computer Algebra in Scientific Computing (CASC). Bucharest, Romania.

Mar 2016. *Computing Pretropisms for the Cyclic n-Roots Problem.* European Workshop on Computational Geometry (EuroCG). Lugano, Switzerland.

Oct 2015. *Polynomial Homotopy Continuation in the Cloud.* Special Session on Algebraic Statistics, 2015 AMS Fall Central Section Meeting. Chicago, IL.

Mar 2012. *Strong Divisibility, Cyclotomic Polynomials, and Iterated Polynomials.* Computer Algebra Group Seminar at Simon Fraser University. Burnaby, Canada.

Funded Research

1. Title : Polynomial Homotopy Continuation in SageMath
   PI(s) : Jeff Sommars
   Source : *Institute for Mathematics and its Applications*
   Amount : ≈$12,000
   Period : 10/15/17 – 10/21/17
   Note : Coding sprint at the *Institute for Mathematics and its Applications* for eight participants

2. Title : A Computer Algebra System for R: **m2r** through the Cloud with EC2
PI(s) : David Kahle, Chris O'Neill, and Jeff Sommars
Source : Amazon Web Services
Amount : ≈$14,000
Period : 9/30/17 – 9/30/18
Note : Currently under review.

3. Title : A Computer Algebra System for R: Macaulay2 and the **m2r** Package
PI(s) : David Kahle, Chris O'Neill, and Jeff Sommars
Source : National Science Foundation: Supported by Grant Number DMS 1321794
Amount : $1500
Period : 5/3/17 – 5/7/17

4. Title : A Computer Algebra System for R: Macaulay2 and the **m2r** Package
PI(s) : David Kahle, Chris O'Neill, and Jeff Sommars
Source : National Science Foundation: Supported by Grant Number DMS 1321794
Amount : $1500
Period : 10/9/16 – 10/13/16

Travel Awards

1. Event : Mittag-Leffer Institute Program on Tropical Geometry, Amoebas and Polytopes
Amount : ≈$1300 and accomodation
Period : 1/15/18 – 2/17/18

2. Event : Stockholm Master Class in Tropical Geometry. Stockholm.
Amount : Accomodation
Period : 8/14/17 – 8/26/17

3. Event : Macaulay2 Tutorial. Georgia Tech.
Amount : $150 and accomodation
Period : 7/27/17 – 7/29/17

4. Event : Macaulay2 Conference. UC Berkeley.
Amount : $700
Period : 7/17/17 – 7/21/17

5. Event : Joint Mathematics Meetings. Atlanta, GA
Amount : $950
Period : 1/4/17 – 1/4/17

6. Event : AMS Mathematics Research Community in Algebraic Statistics. Snowbird, Utah
Amount : ≈$700, accomodation, and meals,
Period : 6/12/16 – 6/18/16

7. Event : Macaulay2 Workshop. University of Warwick
Amount : $750 and accomodation,
Period : 5/23/16 – 5/26/16

8. Event : Macaulay2 Workshop. University of Utah
Amount : $450 and accomodation
Period : 5/7/16 – 5/10/16

9. Event : Macaulay2 Workshop. Boise State University
Amount : ≈$800 and accomodation
Period : 5/27/15 – 5/30/15

10. Event : Macaulay2 Conference. University of Illinois
Amount : $400
Period : 6/16/14 – 6/20/14

Software

DynamicPrevariety. Compute tropical prevarieties. C++.

MonodromySolver. With Timothy Duff, Cvetelina Hill, Anders Nedergaard Jensen, Kisun Lee and Anton Leykin. Compute solutions of generic polynomial systems via monodromy. Macaulay2.

m2r. With David Kahle and Chris O'Neill. Interface to allow R to communicate dynamically with Macaulay2. R and Macaulay2.

Tropical.m2. With Carlos Amèndola, Kathlèn Kohn, Sara Lamboglia, Diane Maclagan, Ben Smith, Paolo Tripoli and Magdalena Zajaczkowska. Package for computations in tropical geometry in Macaulay2. Macaulay2.

pmonodromy. With Nathan Bliss and Anton Leykin. Simulate a parallel monodromy algorithm. C++.

PolyGraph. Compute symmetry of support sets of polynomial systems. Sage.

Professional Memberships

American Mathematical Society

Society for Industrial and Applied Mathematics

Undergraduate Research Supervised

Philip Hossu: automatic exploitation of symmetry in polynomial system solving