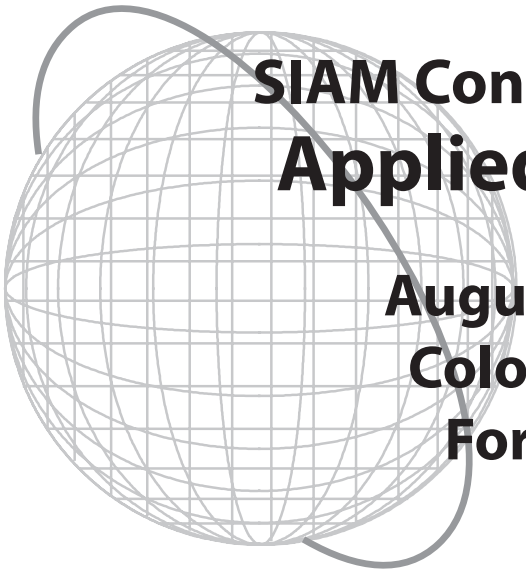

SIAM Conference on Applied Algebraic Geometry

August 1-4, 2013
Colorado State University
Fort Collins, Colorado, USA

Sponsored by the SIAM Activity Group on Algebraic Geometry

The purpose of the SIAM Activity Group in Algebraic Geometry is to bring together researchers who use algebraic geometry in industrial and applied mathematics. "Algebraic geometry" is interpreted broadly to include at least: algebraic geometry, commutative algebra, noncommutative algebra, symbolic and numeric computation, algebraic and geometric combinatorics, representation theory, and algebraic topology. These methods have already seen applications in: biology, coding theory, cryptography, combustion, computational geometry, computer graphics, quantum computing, control theory, geometric design, complexity theory, machine learning, nonlinear partial differential equations, optimization, robotics, and statistics.

We welcome participation from both theoretical mathematical areas and application areas not on this list which fall under this broadly interpreted notion of algebraic geometry and its applications.

2013 is designated as the year of Math of Planet Earth.
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http://www.crm.umontreal.ca/Math2013/en/

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The SIAM registration desk is located in the Andrew G. Clark Building – Clark A wing. It is open during the following hours:

Thursday, August 1
7:00 AM – 5:00 PM

Friday, August 2
7:30 AM – 4:00 PM

Saturday, August 3
7:30 AM – 4:00 PM

Sunday, August 4
7:30 AM – 2:00 PM

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Fort Collins, CO 80523

University Telephone Number

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Kidstown Drop-In Child Care Center

2700 S. College Avenue

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Website: *http://www.kidstowncenters.com/home/locations/fort-collins-colorado/*

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Each meeting room is equipped with a ceiling-mounted projector for use with a laptop, document camera and a white board. Cables or adaptors for Apple computers are not supplied, as they vary for each model. Please bring your own cable/adaptor if using an Apple computer.

A graduate student with working knowledge of the audio-visual equipment will be stationed in each room during all sessions.

If you have questions regarding availability of equipment in the meeting room of your presentation, please see a university staff member at the registration desk.

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Registration Fee Includes

- Admission to all technical sessions
- Business Meeting (open to SIAG/AG members)
- Coffee breaks daily
- Room set-ups and audio/visual equipment
- Welcome Reception and Poster Session

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Important Notice to Poster Presenters

The poster session is scheduled for Thursday, August 1 at 6:00 PM. Poster presenters are requested to set up their poster material on the provided 40" by 60" (1m by 1.5m) boards in the North Ballroom at Lory Student Center between 5:00 and 6:00 p.m. Alternately, poster presenters may leave their posters at the registration desk before 4:00 PM on Thursday, and the poster will be set up for them. All materials must be posted by Thursday, August 1, at 6:00 PM, the official start time of the session. Poster displays must be removed by 8:00 PM. Posters remaining after this time will be discarded. SIAM is not responsible for discarded posters.

SIAM Books and Journals

Display copies of books and complimentary copies of journals are available on site. SIAM books are available at a discounted price during the conference. If a SIAM books representative is not available, order forms are available at the display. Orders can be mailed to SIAM (information is on the order form) or books can be ordered online using the coupon code.

Table Top Displays

Oxford University Press/Oxford Journals

SIAM

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Sven Leyffer, SIAM Vice President for Programs (*vpp@siam.org*)

Get-togethers

Welcome Reception and Poster Session

Thursday, August 1

6:00 PM - 8:00 PM

Business Meeting
(open to SIAG/AG members)

Saturday, August 3

1:00 PM – 1:50 PM

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SIAM Activity Group on Algebraic Geometry SI(AG)^2

www.siam.org/activity/ag

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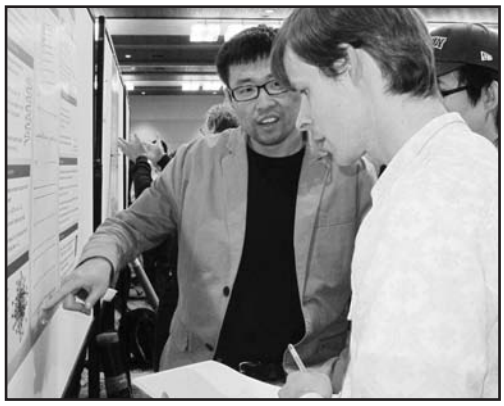

Collaborate and interact with mathematicians and applied scientists whose work involves algebraic geometry.

ACTIVITIES INCLUDE:

- Special sessions at SIAM Annual Meetings
- Biennial Conference
- Wiki

SIAM Conference on
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- Eligibility for candidacy for SIAG/AG office
- Participation in the selection of SIAG/AG officers

ELIGIBILITY:

- Be a current SIAM member.

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- $10 per year
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Invited Plenary Speakers

*** All Invited Plenary Presentations will take place in Andrew G. Clark Building – A 101**

Thursday, August 1

8:30 AM – 9:30 AM

IP1 How Applied Algebraic Geometry is Useful in Pure Mathematics

Ravi Vakil, *Stanford University, USA*

2:00 PM – 3:00 PM

IP2 Tale of Two Theorems

Greg Blekherman, *Georgia Institute of Technology, USA*

Friday, August 2

8:30 AM – 9:30 AM

IP3 On k-apart Configuration Spaces

Yuliy Baryshnikov, *University of Illinois at Urbana-Champaign, USA*

2:00 PM – 3:00 PM

IP4 Numerics and Algebraic Geometry

Sandra Di Rocco, *KTH Stockholm, Sweden*

Saturday, August 3

8:30 AM – 9:30 AM

IP5 Algebraic Geometry in System Biology

Carsten Wiuf, *University of Copenhagen, Denmark*

2:00 PM – 3:00 PM

IP6 Cluster Algebra and Complex Volume of Knots

Rei Inoue, *Chiba University, Japan*

Invited Plenary Speakers

*** All Invited Plenary Presentations will take place in Andrew G. Clark Building – A 101****

Sunday, August 4

8:00 AM – 9:00 AM

IP7 Speeding up Lattice Reduction with Numerical Linear Algebra Techniques

Damien Stehlé, *École Normale Supérieure de Lyon, France*

1:30 PM – 2:30 PM

IP8 Multivariate Polynomial Interpolation Provides Surprising Combinatorial Insights: Zonotopal Algebra and Beyond

Olga Holtz, *University of California, Berkeley, USA and Technische Universitat Berlin, Germany*

Program and Abstracts

SIAM Conference on Applied Algebraic Geometry

August 1-4, 2013
Colorado State University
Fort Collins, Colorado, USA

Thursday, August 1

Registration

7:00 AM-5:00 PM

Room:Andrew G. Clark Building – Clark A Wing

Welcome Remarks

8:20 AM-8:30 AM

Room:Andrew G. Clark Building – A101

Thursday, August 1

IP1

How Applied Algebraic Geometry is Useful in Pure Mathematics

8:30 AM-9:30 AM

Room:Andrew G. Clark Building – A101

Chair: Alicia Dickenstein, Universidad de Buenos Aires, Argentina

For historical reasons, the culture of pure algebraic geometry has often been quite distant from applications, and "applied" methods. While there are some good reasons for the distinction between the pure and applied side of the subject, this division is, happily, gradually eroding. I will describe some examples of where in theoretical advances have been built on insights and experiences coming from the more applied side of the subject. For this reason, it is worth our time to learn to talk to people in different parts of the subjects, even if the cultural and linguistical differences sometimes make it challenging.

Ravi Vakil
Stanford University, USA

Coffee Break

9:30 AM-10:00 AM

Room:Andrew G. Clark Building – Clark A Wing

Thursday, August 1

MS1

Identifiability Problems in Biology and Statistics - Part I of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A102

For Part 2 see MS25

The focus of this minisymposium is on solving identifiability problems arising in biology and statistics. Applied topics will include differential equation models arising in biology, structural equation models arising in statistics, mass action models, phylogenetic models, and boolean models. Emphasis will be on the algebraic methods used to solve these problems.

Organizer: Nicolette Meshkat
North Carolina State University, USA

Organizer: Seth Sullivant
North Carolina State University, USA

10:00-10:25 Identifiability and Parameter Estimation in Modeling Disease Dynamics
Marisa Eisenberg, University of Michigan, USA

10:30-10:55 Differential Algebra Techniques for Identifiability of Biological Systems
Maria Pia Saccomani, University of Padova, Italy

11:00-11:25 Identifiability of Mechanical Systems in Cardiovascular Modeling
Adam Mahdi, Nicolette Meshkat, and Seth Sullivant, North Carolina State University, USA

11:30-11:55 Identifiable Reparameterizations of Linear Ode Systems
Nicolette Meshkat and Seth Sullivant, North Carolina State University, USA

Thursday, August 1

MS2

Developments in Cylindrical Algebraic Decomposition and Quantifier Elimination - Part I of II

10:00 AM-11:30 AM

Room: Andrew G. Clark Building – A103

For Part 2 see MS26

Cylindrical Algebraic Decomposition (CAD) was invented by Collins (1975) to solve problems of Quantifier Elimination. Although the worst case is doubly exponential in the number of variables, it has proved to be a practical method in many cases. There have been many practical improvements in the CAD algorithm in the intervening period, as well as a completely different approach based on regular chains. In addition, we know much more about how to adapt CAD to the specific problem being studied. This symposium will review recent developments and discuss the still-open problems.

Organizer: Changbo Chen
University of Western Ontario, Canada

Organizer: James Davenport
University of Bath, United Kingdom

Organizer: Marc Moreno Maza
University of Western Ontario, Canada

10:00-10:25 Beyond Equational Constraints in CAD

Russell Bradford, James Davenport, Matthew England, and *David J. Wilson*, University of Bath, United Kingdom

10:30-10:55 Automatic Proofs of Transcendental Function Inequalities and Their Applications

Grant O. Passmore, University of Edinburgh, United Kingdom

11:00-11:25 Utilising New CAD Developments for Simplification in Computer Algebra

Matthew England, Russell Bradford, James Davenport, and David J. Wilson, University of Bath, United Kingdom

Thursday, August 1

MS3

Numerical Perspectives on Classical Themes in Algebraic Geometry - Part I of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A104

For Part 2 see MS15

Recent advances in numerical techniques in algebraic geometry have piqued the interest of scholars dealing with classical themes in the discipline. This mini-symposium will get together a group of practitioners to share recent progress and trends on the impact of numerical techniques on classical themes.

Organizer: Gianmario Besana
DePaul University, USA

10:00-10:25 Non-convex Optimization and Numerical Homotopies

Chris Peterson, Colorado State University, USA

10:30-10:55 A Numerical Algorithm for the Topological Euler Characteristic of Algebraic Varieties

Christine Jost, Stockholm University, Sweden

11:00-11:25 Computing H-Bases to Precondition Polynomial Systems for Homotopy Continuation

Steven L. Ihde and Daniel J. Bates, Colorado State University, USA; Jonathan Hauenstein, North Carolina State University, USA

11:30-11:55 Random Points on Curves in R^n with Application to Parameterizing QSIC

Barry H. Dayton, Northeastern Illinois University, USA

Thursday, August 1

MS4

Arithmetic Geometry - Part I of III

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A201

For Part 2 see MS16

The minisymposium addresses current topics in computational arithmetic geometry, including abelian surfaces, del Pezzo surfaces, cohomology of varieties, and arithmetic of Jacobians.

Organizer: Rachel Pries
Colorado State University, USA

10:00-10:25 2-torsion Brauer Classes on Surfaces with Hyperelliptic Fibrations

Brendan Creutz, University of Sydney, Australia; *Bianca Viray*, Brown University, USA

10:30-10:55 The Number of Nonsimple Principally Polarized Abelian Surfaces over a Finite Field

Everett W. Howe, Center for Communications Research, USA; Jeff Achter, Colorado State University, USA

11:00-11:25 Computing Discrete Logarithms in the Jacobian of High-Genus Hyperelliptic Curves and Applications

Andreas Stein, Carl von Ossietzky Universitaet Oldenburg, Germany

11:30-11:55 Vertical Brauer Groups and Del Pezzo Surfaces of Degree 4

Tony Varilly-Alvarado, Rice University, USA; Bianca Viray, Brown University, USA

Thursday, August 1

MS5

Cryptography and Number Theory - Part I of II

10:00 AM-12:00 PM

Room: Andrew G. Clark Building – A202

For Part 2 see MS17

Topics include cryptographic pairings, the use of linear codes in cryptography and multi-party computation, and lattice theory with applications to wireless communication.

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

Organizer: Elisa Gorla
University of Neuchatel, Switzerland

Organizer: Joachim Rosenthal
Universität Zürich, Switzerland

10:00-10:25 Exponentiating in Pairing Groups

Michael Naehrig, Craig Costello, and Joppe W. Bos, Microsoft Research, USA

10:30-10:55 Point Compression for the Trace Zero Variety

Maike Massierer, University of Basel and University of Neuchatel, Switzerland; Elisa Gorla, University of Neuchatel, Switzerland

11:00-11:25 On Retrieving a Representation of An Algebraic Geometry Code

Edgar Martínez Moro and Irene Marquez-Corbella, Universidad de Valladolid, Spain; Ruud Pellikaan, TU Eindhoven, The Netherlands; Diego Ruano, Aalborg University, Denmark

11:30-11:55 Arithmetic Codices and Applications to Cryptography

Ignacio Cascudo, Centrum voor Wiskunde en Informatica, The Netherlands; Ronald Cramer, CWI, Amsterdam, Netherlands; Chaoping Xing, NTU Singapore, Singapore

Thursday, August 1

MS6

Toric Geometry, Lattice Points, and Applications - Part I of II

10:00 AM-12:30 PM

Room: Andrew G. Clark Building – A203

For Part 2 see MS28

The interplay of algebraic geometry with convex and polyhedral geometry has been an on-going success story for over 30 years. While toric varieties have been established by now as fascinating objects of study and important examples of higher-dimensional varieties, in particular their symbiosis with lattice polytopes continues to fuel interdisciplinary research. In this minisymposium we will focus on (1) combinatorial and computational aspects of lattice points, such as Ehrhart theory and lattice point enumeration; and (2) lattice points occurring as invariants of toric varieties.

Organizer: Ivan Soprunov
Cleveland State University, USA

Organizer: Benjamin T. Nill
Case Western Reserve University, USA

10:00-10:25 (Convex) Normal Lattice Polytopes

Jan Hofmann and Petra Meyer, Goethe University, Germany

10:30-10:55 Perturbation of Transportation Polytopes

Fu Liu, University of California, Davis, USA

11:00-11:25 New Developments in LattE Integrale

Velleda Baldoni, University of Rome II, Tor Vergata, Italy; Nicole Berline, Ecole Polytechnique, France; Jesús A. De Loera and Brandon E. Dutra, University of California, Davis, USA; *Matthias Koeppe*, University of California, Davis, USA; Michèle Vergne, Universite Paris 7-Denis Diderot, France

continued in next column

11:30-11:55 Combinatorial Mutations and Fano Manifolds

Alexander M. Kasprzyk, Imperial College London, United Kingdom

12:00-12:25 Toric Embedding and Birational Geometry

Hamid Ahmadinezhad, Austrian Academy of Sciences, Austria

Thursday, August 1

MS7

Algebro-geometric Approaches to Tensor Spaces, Tensor Decomposition, and Identifiability - Part I of III

10:00 AM-12:00 PM

Room: Andrew G. Clark Building – A204

For Part 2 see MS31

This session is concerned with algebraic and geometric approaches to problems related to: 1) spaces of tensors; 2) various notions of ranks for tensors; 3) tensor decomposition; 4) identifiability; and 5) representation theory and tensors.

Organizer: Hirotachi Abo
University of Idaho, USA

Organizer: Luke Oeding
University of California, Berkeley, USA

Organizer: Giorgio Ottaviani
University of Firenze, Italy

Organizer: Chris Peterson
Colorado State University, USA

10:00-10:25 Projective Methods for the Identifiability of Tensors I
Luca Chiantini, Università di Siena, Italy

10:30-10:55 Projective Methods for the Identifiability of Tensors II
Cristiano Bocci, Università di Siena, Italy

11:00-11:25 Tensor Ranks
Alessandra Bernardi, University of Torino, Italy

11:30-11:55 Decomposition of Infinite-dimensional Tensors
Lek-Heng Lim, University of Chicago, USA; Pierre Comon, CNRS, France

Thursday, August 1

MS8

Software for Algebraic Geometry - Part I of II

10:00 AM-12:00 PM

Room: Andrew G. Clark Building – A205

For Part 2 see MS32

Macaulay2 is a software system devoted to supporting research in algebraic geometry and commutative algebra. Developed by Daniel Grayson and Michael Stillman, it has played a significant role in many branches of applied algebraic geometry. Experiments with this system continue to be particularly valuable in collecting heuristic evidence, establishing patterns, formulating conjectures, and exhaustively exploring examples. As an added benefit, a computational perspective often leads to deeper theoretical insights. The talks in this minisymposium will showcase the range of new research that advances, exploits, or promotes Macaulay2.

Organizer: Gregory G. Smith
Queen's University, Canada

10:00-10:25 Computation in the Intersection Ring of Flag Bundles and Isotropic Flag Bundles
Dan Grayson, University of Illinois at Urbana-Champaign, USA; Alexandra Seceleanu, University of Nebraska, Lincoln, USA; *Mike Stillman*, Cornell University, USA

10:30-10:55 State Polytopes of Ideals and Syzygies and Geometric Invariant Theory for Moduli of Curves
Anand Deopurkar, Columbia University, USA; Maksym Fedorchuk, Boston College, USA; *David Swinarski*, Fordham University, USA

11:00-11:25 Effective Calculations of Cohomology via Spectral Sequences
Nathan Grieve, Queen's University, Canada

11:30-11:55 Fixed Point Sets in Affine Buildings
Annette Werner, Goethe University, Germany; *Josephine Yu*, Georgia Institute of Technology, USA

Thursday, August 1

MS9

Real Algebraic Geometry and Optimization - Part I of III

10:00 AM-12:30 PM

Room: Andrew G. Clark Building – A207

For Part 2 see MS21

The minisymposium presents recent developments in the interplay of real algebraic geometry and optimization. Topics include positive polynomials, sums of squares, semidefinite programming, polynomial optimization, linear and semidefinite relaxations, symmetries, and spectrahedra.

Organizer: Greg Blekherman
Georgia Institute of Technology, USA

Organizer: Cordian Riener
Aalto University, Finland

Organizer: Thorsten Theobald
Johann Wolfgang Goethe University, Frankfurt am Main, Germany

10:00-10:25 Bounds on the Equivariant Betti Numbers of Symmetric Semi-Algebraic Sets
Cordian Riener, Aalto University, Finland; Saugata Basu, Purdue University, USA

10:30-10:55 When is Every Nonnegative Quadric a Sum of Squares?
Mauricio Velasco, Universidad de los Andes, Colombia; Gregoriy Blekherman, Georgia Institute of Technology, USA; Gregory G. Smith, Queen's University, Canada

11:00-11:25 Positive Polynomials on Non-Compact Sets
Daniel Plaumann, University of Konstanz, Germany

11:30-11:55 Containment Problems for Polytopes and Spectrahedra
Kai Kellner, Goethe University, Germany; Thorsten Theobald, Johann Wolfgang Goethe University, Frankfurt am Main, Germany; Christian Trabandt, Goethe University, Germany

12:00-12:25 On Hyperbolicity Cones and Spectrahedra
Petter Branden, KTH Royal Institute of Technology, Sweden

Thursday, August 1

MS10

Exact Certificates in Nonlinear Global Optimization - Part I of II

10:00 AM-12:00 PM

Room: Andrew G. Clark Building – C146

For Part 2 see MS22

Symbolic computation methods afford exact computation and verification of the globality of an infimum or optimum of a multivariate polynomial or rational function. However, the exact optima and the corresponding proofs, say sums-of-squares, cannot always be aquired directly by symbolic methods, and numeric optimization code, say semidefinite programming or Newton iteration, is deployed to approximate exact certificates of optimality. The scalars in the exact certificates may have to be algebraic numbers, and proofs may be rationalized by verifying rational numbers near the optima. An exception are Sturm sequences or more generally Tarski's transfer principle and Artin's theorem on sum-of-squares.

Organizer: Erich Kaltofen
North Carolina State University, USA

Organizer: Mohab Safey El Din
Université Paris 6, France

Organizer: Lihong Zhi
Academia Sinica, China

10:00-10:25 Bounded Symbolic-Numeric Cylindrical Algebraic Decomposition for Solving Optimization Problems
Hidenao Iwane, Fujitsu Laboratories LTD., Japan; Hirokazu Anai, Kyushu University, Japan

10:30-10:55 Polynomial Optimization with Real Varieties
Jiawang Nie, University of California, San Diego, USA

11:00-11:25 Sums of Squares of Polynomials with Rational Coefficients
Claus Scheiderer, University of Konstanz, Germany

11:30-11:55 Invited. Participation Uncertain 1
Graziano Chesi, University of Hong Kong, China

MS11

See Friday morning

Thursday, August 1

MS12

Tropical Geometry and Combinatorics in Dynamical Systems - Part I of II

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 108

For Part 2 see MS24

There are interesting dynamical systems given by rational maps and piecewise-linear maps whose symmetry is related to combinatorial mathematics as crystal base, geometric crystal, tropical geometry, cluster algebra and so on. In this session we take a view of the recent development in this area and related mathematics. Through this opportunity we also hope to find new links between tropical geometry and combinatorics via dynamical systems.

Organizer: Rei Inoue
Chiba University, Japan

Organizer: Thomas Lam
University of Michigan, USA

10:00-10:25 Tropical Geometry and Combinatorics in Integrable Cellular Automata
Rei Inoue, Chiba University, Japan

10:30-10:55 Rigged Configurations and Box-Ball Systems
Reiho Sakamoto, Tokyo University of Science, Japan

11:00-11:25 Combinatorics of the Tropical Moduli Space of Curves
Melody Chan, Harvard University, USA

11:30-11:55 The Dynamics of Chip-firing on Abstract Tropical Curves
Spencer Backman, Georgia Institute of Technology, USA

Thursday, August 1

CP1

10:00 AM-12:30 PM

Room:Willard O. Eddy Hall - 106

Chair: Patrick Shipman, Colorado State University, USA

10:00-10:25 Construction of Lorentz-Conformal Coordinate Transformations
Patrick Shipman, Colorado State University, USA

10:30-10:55 Geometrically Minimal Realizations for Linear Control Systems over Boolean Semiring
Oleg O. Vasil'ev, Russian Academy of Sciences, Russia

11:00-11:25 A Dynamical System Which Produces Mutually Unbiased Bases and An Application of Persistent Homology
Francis C. Motta, Colorado State University, USA

11:30-11:55 Support Function Based Description of Topology and Approximation of Real Algebraic Curves
Eva Cernohorská and Zbynek Sir, Charles University, Prague, Czech Republic

12:00-12:25 Free Tilings on Genus-3 Surfaces and Resulting Crystalline Patterns
Vanessa Robins, Australian National University, Australia; Myfanwy Evans, Universität Erlangen-Nürnberg, Germany; Stuart Ramsden and Stephen Hyde, Australian National University, Australia

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Thursday, August 1

IP2

A Tale of Two Theorems

2:00 PM-3:00 PM

Room:Andrew G. Clark Building – A101

Chair: Frank Sottile, Texas A&M University, USA

I will explain and draw connections between the following two theorems: (1) Hilbert's theorem on nonnegative polynomials and sums of squares, and (2) Classification of varieties of minimal degree by Del Pezzo and Bertini. This will result in the classification of all varieties on which nonnegative polynomials are equal to sums of squares. Along the way I will provide an introduction to Convex Algebraic Geometry. The talk is based on joint work with Greg Smith and Mauricio Velasco.

Greg Blekherman
Georgia Institute of Technology, USA

Coffee Break

3:00 PM-3:30 PM

Room:Andrew G. Clark Building – Clark A Wing

Thursday, August 1

MS13

Algebraic Aspects of Biochemical Reaction Networks - Part I of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A102

For Part 2 see MS38

Many scientific disciplines use reaction networks to represent and study interactions among species, be they chemical species in (bio) chemistry or living organisms in ecology or epidemiology. It has long been recognized that qualitative properties of reaction networks must be understood as independently of kinetic parameters as possible. This is because rates are usually unknown or poorly known, and simulations alone cannot prove asymptotic properties. Algebra and algebraic geometry are increasingly making important contributions, particularly regarding the multiplicity and stability of equilibria. This minisymposium will be a venue for exchanges on the latest developments in this area.

Organizer: Anne Shiu
University of Chicago, USA

Organizer: Gilles Gnacadja
Amgen Inc., USA

3:30-3:55 Characterization of Steady States of General Mass Action Systems by Correspondence to Weakly Reversible Networks
Matthew Johnston, University of Wisconsin, Madison, USA

4:00-4:25 Chemical Reaction Networks As Compartmental Systems
David Siegel, University of Waterloo, Canada

4:30-4:55 Identification of Multistationary Reaction Networks Modeled with Power-law Kinetics
Elisenda Feliu and Carsten Wiuf, University of Copenhagen, Denmark

continued in next column

5:00-5:25 Polynomial Inequalities for Bistability in a Double Phosphorylation Network
Carsten Conradi, Max Planck Institute for Dynamics of Complex Systems, Germany; Maya Mincheva, Northern Illinois University, USA

5:30-5:55 Calculating Detailed-Balanced Equilibrium by Fixed-Point Iterations and Cell Exclusion
Gilles Gnacadja, Amgen Inc., USA

Thursday, August 1

MS14

Algebraic Aspects of Large-scale Statistics

3:30 PM-5:00 PM

Room: Andrew G. Clark Building – A103

This minisymposium will consist of presentations describing the relevance of algebraic-geometric ideas in larger sized problems in data analysis than those typically considered by algebraic geometers. Large-scale settings in which algebraic tools can be brought to bear in fruitful ways include ranking problems, high-dimensional statistics, graphical modeling, sampling, and questions involving causality.

Organizer: Venkat Chandrasekaran
California Institute of Technology, USA

3:30-3:55 Differentiable, Continuous, and Combinatorial Hodge Theories
Lek-Heng Lim, University of Chicago, USA

4:00-4:25 It is Hard to be Strongly Faithful
Caroline Uhler, Institute of Science and Technology, Austria; Garvesh Raskutti, University of North Carolina, USA; Peter Buehlmann, ETH Zürich, Switzerland; Bin Yu, University of California, Berkeley, USA

4:30-4:55 Computational and Statistical Tradeoffs Via Convex Relaxation
Venkat Chandrasekaran, California Institute of Technology, USA; Michael Jordan, University of California, Berkeley, USA

Thursday, August 1

MS15

Numerical Perspectives on Classical Themes in Algebraic Geometry - Part II of II

3:30 PM-5:30 PM

Room: Andrew G. Clark Building – A104

For Part 1 see MS3
Recent advances in numerical techniques in algebraic geometry have piqued the interest of scholars dealing with classical themes in the discipline. This minisymposium will get together a group of practitioners to share recent progress and trends on the impact of numerical techniques on classical themes.

Organizer: Gianmario Besana
DePaul University, USA

3:30-3:55 Macaulay Dual Space and Numerical Primary Decomposition
Robert Krone, Georgia Institute of Technology, USA; Jonathan Hauenstein, North Carolina State University, USA; Anton Leykin, Georgia Institute of Technology, USA

4:00-4:25 Certifiable Numerical Computations in Schubert Calculus
Nickolas Hein, University of Nebraska at Kearney, USA; Jonathan Hauenstein, North Carolina State University, USA; Frank Sottile, Texas A&M University, USA

4:30-4:55 Determinantal Representations of Hyperbolic Curves via Polynomial Homotopy Continuation
Anton Leykin, Georgia Institute of Technology, USA

5:00-5:25 On a Family of Determinantal Varieties Arising as Critical Loci in a Classical Computer Vision Problem
Gianmario Besana, DePaul University, USA

Thursday, August 1

MS16

Arithmetic Geometry - Part II of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A201

For Part 1 see MS4
For Part 3 see MS41
The minisymposium addresses current topics in computational arithmetic geometry, including abelian surfaces, del Pezzo surfaces, cohomology of varieties, and arithmetic of Jacobians.

Organizer: Rachel Pries
Colorado State University, USA

3:30-3:55 Arithmetic Occult Periods
Jeff Achter, Colorado State University, USA

4:00-4:25 Sato-Tate Groups of Abelian Surfaces and Threefolds
Francesc Fité, University of Bielefeld, Germany; *Kiran S. Kedlaya*, University of California, San Diego, USA; Víctor Rotger, Universitat Politecnica de Catalunya, Spain; Andrew V. Sutherland, Massachusetts Institute of Technology, USA

4:30-4:55 Crystalline Cohomology of the Igusa Tower
Bryden Cais, University of Arizona, USA

5:00-5:25 Colmez's Product Formula for CM Abelian Varieties
Andrew Obus, Columbia University, USA

5:30-5:55 Rational Points on Twists of Modular Curves
Ekin Ozman, University of Texas at Austin, USA

Thursday, August 1

MS17

Cryptography and Number Theory - Part II of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A202

For Part 1 see MS5

Topics include cryptographic pairings, the use of linear codes in cryptography and multi-party computation, and lattice theory with applications to wireless communication.

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

Organizer: Elisa Gorla
University of Neuchatel, Switzerland

Organizer: Joachim Rosenthal
Universität Zürich, Switzerland

3:30-3:55 Short Algebraic-Geometry Codes and Their Weight Distribution for Diffusion in Block Ciphers and Hash Functions
Daniel Augot, INRIA, France

4:00-4:25 New Matrix-Based Lattice Construction Techniques
Carmelo Interlando, San Diego State University, USA

4:30-4:55 On the Design of Wiretap Codes
Frederique Oggier, and *Jerome Ducoat*, Nanyang Technological University, Singapore

5:00-5:25 Orders of Central Simple Algebras as a Tool for Wireless Communications
Camilla Hollanti, Aalto University, Finland

5:30-5:55 Probability Bounds for Algebraic Lattice Codes
David Karpuk, Aalto University, Finland

Thursday, August 1

MS18

Applications to Image Processing and Shape Analysis - Part I of III

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A203

For Part 2 see MS30

Methods from algebraic geometry and algebraic topology lie at the foundations of many existing algorithms in image processing and shape analysis. The talks in the proposed minisymposium will be devoted both to newly developed results in this area and to the discussion of open problems.

Organizer: Irina Kogan
North Carolina State University, USA

Organizer: Facundo Memoli
University of Adelaide, Australia

3:30-3:55 Invariant Histograms and Signatures for Object Recognition and Symmetry Detection
Peter Olver, University of Minnesota, USA

4:00-4:25 Light-weight Methods for Automatic Recognition in Mobile Applications
Mireille Boutin, Purdue University, USA

4:30-4:55 Estimating Radar Target Invariants
Matthew Ferrara and Gregory Arnold, Matrix Research, Inc., USA; Jason T. Parker, Air Force Research Laboratory, USA

5:00-5:25 The Ideal of the Trifocal Variety
Chris Aholt, University of Washington, USA; *Luke Oeding*, University of California, Berkeley, USA

Thursday, August 1

MS19

Algebraic Geometry of Tensor Decompositions - Part I of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A204

For Part 2 see MS44

We are interested in various aspects of tensor decompositions studied under the light of algebraic geometry --- complex, real, convex, and tropical.

Organizer: Lek-Heng Lim
University of Chicago, USA

3:30-3:55 Counting Singular Vectors of a Multidimensional Tensor
Giorgio Ottaviani, University of Firenze, Italy; Shmuel Friedland, University of Illinois, Chicago, USA

4:00-4:25 Tensor Decomposition, Low Rank Structured Matrix Approximation and Applications
Bernard Mourrain, INRIA Sophia Antipolis, France

4:30-4:55 On Best $(r_1,\ldots,r_d)$ Approximation of d-Mode Tensors
Shmuel Friedland, University of Illinois, Chicago, USA

5:00-5:25 Direct Sum Decomposability of Polynomials
Weronika Buczýnska and Jarosław Buczýnski, IMPAN, Poland; *Zach Teitler*, Boise State University, USA

5:30-5:55 Computational Complexity of Tensor Problems
Christopher Hillar, University of California, Berkeley, USA; Lek-Heng Lim, University of Chicago, USA

Thursday, August 1

MS20

Computations and Effective Bounds in Commutative Algebra - Part I of II

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A205

For Part 2 see MS45

In this minisymposium, we propose to bring together researchers both which are developing software for computations in commutative algebra and algebraic geometry, and also researchers who are developing theoretical bounds on what might be computed.

Organizer: Claudiu Raicu
Princeton University, USA

Organizer: Karl Schwede
Pennsylvania State University, USA

Organizer: Uli Walther
Purdue University, USA

3:30-3:55 Effective Computing in Rings with Infinite Numbers of Variables
Christopher Hillar, University of California, Berkeley, USA; Robert Krone and Anton Leykin, Georgia Institute of Technology, USA; Seth Sullivant, North Carolina State University, USA

4:00-4:25 Geometry of Wachspress Surfaces
Corey Irving, Santa Clara University, USA; *Hal Schenck*, University of Illinois, USA

4:30-4:55 Bounds on Projective Dimension
Alexandra Seceleanu, University of Nebraska, Lincoln, USA

5:00-5:25 Ghosts of the Jacobian Ideal and Graphic Arrangements
Max Wakefield, United States Naval Academy, USA

Thursday, August 1

MS21

Real Algebraic Geometry and Optimization - Part II of III

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A207

For Part 1 see MS9
For Part 3 see MS33

The minisymposium presents recent developments in the interplay of real algebraic geometry and optimization. Topics include positive polynomials, sums of squares, semidefinite programming, polynomial optimization, linear and semidefinite relaxations, symmetries, and spectrahedra.

Organizer: Greg Blekherman
Georgia Institute of Technology, USA

Organizer: Cordian Riener
Aalto University, Finland

Organizer: Thorsten Theobald
Johann Wolfgang Goethe University, Frankfurt am Main, Germany

3:30-3:55 Computing Upper Bounds for Densest Polytope Packings
Frank Vallentin, Delft University of Technology, Netherlands

4:00-4:25 A Concrete Approach to Hermitian Determinantal Representations
Cynthia Vinzant, University of Michigan, USA

4:30-4:55 Dimensional Differences Between Faces of Nonnegative Polynomials and Sums of Squares
Sadik Iliman, Goethe University, Germany; Grigoriy Blekherman, Georgia Institute of Technology, USA; Martina Kubitzke, Goethe University, Germany

5:00-5:25 The A-Truncated K-Moment Problem
Jiawang Nie, University of California, San Diego, USA

Thursday, August 1

MS22

Exact Certificates in Nonlinear Global Optimization - Part II of II

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – C146

For Part 1 see MS10

Symbolic computation methods afford exact computation and verification of the globality of an infimum or optimum of a multivariate polynomial or rational function. However, the exact optima and the corresponding proofs, say sums-of-squares, cannot always be aquired directly by symbolic methods, and numeric optimization code, say semidefinite programming or Newton iteration, is deployed to approximate exact certificates of optimality. The scalars in the exact certificates may have to be algebraic numbers, and proofs may be rationalized by verifying rational numbers near the optima. An exception are Sturm sequences or more generally Tarski's transfer principle and Artin's theorem on sum-of-squares.

Organizer: Erich Kaltofen
North Carolina State University, USA

Organizer: Mohab Safey El Din
Université Paris 6, France

Organizer: Lihong Zhi
Academia Sinica, China

3:30-3:55 Inequality Proving and Global Optimization Via a Simplified CAD Projection
Bican Xia, Peking University, China

4:00-4:25 Exact Safety Verification of Interval Hybrid Systems Based on Symbolic-Numeric Computation
Zhengfeng Yang, Min Wu, and Wang Lin, East China Normal University, China

4:30-4:55 Computing Rational Solutions of Linear Matrix Inequalities
Lihong Zhi, Academia Sinica, China; Qingdong Guo, Academia Sinica, Taiwan; Mohab Safey El Din, Université Paris 6, France

continued on next page

5:00-5:25 Polar Varieties and Algebraic Certificates
Aurelien Greuet, Université de Versailles Saint-Quentin-en-Yvelines, France; Feng Guo, University of California, San Diego, USA; *Mohab Safey El Din*, Université Pierre et Marie Curie, France; Lihong Zhi, Academia Sinica, China

Thursday, August 1

MS23

Applied and Computational Topology - Part I of III

3:30 PM-6:00 PM

Room:Willard O. Eddy Hall - 107

For Part 2 see MS48

Applied and computational topology is a vibrant research area that's gained momentum over the last decade. A core aim is data analysis by way of understanding the shape of the data. To devise robust techniques, researchers are interested in questions of stability of topological descriptors. To process modern datasets, the field is interested in efficient algorithms. The goal of the minisymposium is to create a forum for young researchers to present recent developments in the field.

Organizer: Dmitriy Morozov
Lawrence Berkeley National Laboratory, USA

Organizer: Mikael Vejdemo Johansson
University of St. Andrews, United Kingdom

3:30-3:55 A Categorical Approach to Multipersistent Homology
Martina Scolamiero, Politecnico di Torino, Italy; Wojciech Chacholski, KTH Royal Institute of Technology, Sweden; *Francesco Vaccarino*, Politecnico di Torino, Italy

4:00-4:25 New Topological Methods for Robotic Grasping and Machine Learning
Florian T. Pokorny, KTH Royal Institute of Technology, Sweden

4:30-4:55 Computing Persistent Homology in Chunks
Ulrich Bauer, IST, Austria; Michael Kerber, Stanford University, USA; Jan Reininghaus, IST, Austria

5:00-5:25 One the Persistent Homology of Time-Delay Embeddings
Jose Perea and John Harer, Duke University, USA

5:30-5:55 Computational (co) Homology in Electromagnetic Modelling and Material Analysis
Pawel Dlotko, University of Pennsylvania, USA

Thursday, August 1

MS24

Tropical Geometry and Combinatorics in Dynamical Systems - Part II of II

3:30 PM-5:30 PM

Room:Willard O. Eddy Hall - 108

For Part 1 see MS12

There are interesting dynamical systems given by rational maps and piecewise-linear maps whose symmetry is related to combinatorial mathematics as crystal base, geometric crystal, tropical geometry, cluster algebra and so on. In this session we take a view of the recent development in this area and related mathematics. Through this opportunity we also hope to find new links between tropical geometry and combinatorics via dynamical systems.

Organizer: Rei Inoue
Chiba University, Japan

Organizer: Thomas Lam
University of Michigan, USA

3:30-3:55 Generalized Discrete Toda Lattices
Thomas Lam, University of Michigan, USA

4:00-4:25 Tropical Curves in the Planar Dimer Model
Richard Kenyon, Brown University, USA

4:30-4:55 Exotic Cluster Structure in Gl_n
Michael Gekhtman, University of Notre Dame, USA

5:00-5:25 Higher-Dimensional Analogues of Tropical Cluster Combinatorics
Steffen Oppermann, Norwegian University of Science and Technology, Norway; *Hugh Thomas*, University of New Brunswick, Canada

Thursday, August 1

PP1

Welcome Reception and Poster Session

6:00 PM-8:00 PM

Room: Lory Student Center-North Ballroom

Mallows Mixture Model and Its Vanishing Ideal
Brandon W. Bock and Seth Sullivant, North Carolina State University, USA

Cad Numerical Vertebral Surface Refinements and Geometrical Data Development for Surgical Devices Design
Francisco Casesnoves, American Society Mechanical Engineering (Individual Researcher Member)

Geometrical Algorithms for Civil Helicopter (CH) Rotor-Blades Instantaneous Rotation Center Determination in Deformable/ Turbulence Conditions Using Numerical Reuleaux Method (MRM)
Francisco Casesnoves, American Society Mechanical Engineering (Individual Researcher Member)

Distance-Based Phylogenetic Algorithms Around a Polytomy
Ruth E. Davidson and Seth Sullivant, North Carolina State University, USA

Perturbed Regeneration for Finding Singular Solutions
Brent R. Davis, Daniel J. Bates, Chris Peterson, Eric Hanson, and David Eklund, Colorado State University, USA

A Fractal Model of Time
Jorge Diaz-Castro, University of Puerto Rico, Puerto Rico

A Set of Polynomial Systems from Population Biology
Jesse W. Drendel, Colorado State University, USA

Parameterized Polynomial Systems and Numerical Algebraic Geometry
Eric Hanson and Dan Bates, Colorado State University, USA

continued in next column

A Hybrid Numerical-Symbolic Algorithm for Computing the Solutions of Fewnomial Systems
Matthew Niemerg and Dan Bates, Colorado State University, USA; Jon Hauenstein, North Carolina State University, USA; Frank Sottile, Texas A&M University, USA

Machine Learning for Phylogenetic Invariants
Hannah M. Swan, Joseph P. Rusinko, and Emili Price, Winthrop University, USA

Friday, August 2

Registration

7:30 AM-4:00 PM

Room:Andrew G. Clark Building – Clark A Wing

Announcements

8:20 AM-8:30 AM

Room:Andrew G. Clark Building – A101

Friday, August 2

IP3

On k-apart Configuration Spaces

8:30 AM-9:30 AM

Room:Andrew G. Clark Building – A101

Chair: Gunnar E. Carlsson, Stanford University, USA

k-apart - or no-k-equal configuration spaces - are formed by tuples of points in a topological space with no more than k coinciding. They appeared as a model problem in theoretical computer sciences, and are very useful in other applications, such as motion planning in robotics. I will survey some old and new results in the area.

Yuliy Baryshnikov
University of Illinois at Urbana-Champaign, USA

Coffee Break

9:30 AM-10:00 AM

Room:Andrew G. Clark Building – Clark A Wing

Friday, August 2

MS11

Symbolic Combinatorics - Part I of III

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 107

For Part 2 see MS36

In recent years algorithms and software have been developed that allow researchers to discover and verify combinatorial identities as well as understand analytic and algebraic properties of generating functions. The interaction of combinatorics and symbolic computation has had a beneficial impact on both fields. This minisymposium will feature 12 speakers describing recent research combining these areas.

Organizer: Manuel Kauers
RISC, Austria

Organizer: Michael Singer
North Carolina State University, USA

10:00-10:25 On the Summability of Bivariate Rational Functions

Shaoshi Chen and *Michael F. Singer*, North Carolina State University, USA

10:30-10:55 Automated Asymptotics of Multivariate Generating Functions

Robin Pemantle, University of Pennsylvania, USA; Mark Wilson, University of Auckland, New Zealand

11:00-11:25 Euler-Mahonian Statistics Via Polyhedral Geometry

Matthias Beck, San Francisco State University, USA; Benjamin Braun, University of Kentucky, USA

11:30-11:55 Towards a Classification of Restricted Lattice Walks

Stephen Melczer and Marni Mishna, Simon Fraser University, Canada

Friday, August 2

MS25

Identifiability Problems in Biology and Statistics - Part II of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A102

For Part 1 see MS1

The focus of this minisymposium is on solving identifiability problems arising in biology and statistics. Applied topics will include differential equation models arising in biology, structural equation models arising in statistics, mass action models, phylogenetic models, and boolean models. Emphasis will be on the algebraic methods used to solve these problems.

Organizer: Nicolette Meshkat
North Carolina State University, USA

Organizer: Seth Sullivant
North Carolina State University, USA

10:00-10:25 Identifiability of Linear Structural Equation Models

Mathias Drton, University of Washington, USA; Rina Foygel, University of Chicago, USA; Jan Draisma, Technische Universiteit Eindhoven, The Netherlands

10:30-10:55 Identifiability of Structural Equation Models on 6 Random Variables

Luis D. Garcia-Puente, Sam Houston State University, USA

11:00-11:25 Algebraic Theory for Discrete Models in Systems Biology

Franziska B. Hinkelmann, Virginia Tech, USA

11:30-11:55 Scaling Invariants and Symmetry Reduction of Dynamical Systems

Evelyne Hubert, INRIA Méditerranée, France; George Labahn, University of Waterloo, Canada

Friday, August 2

MS26

Developments in Cylindrical Algebraic Decomposition and Quantifier Elimination - Part II of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A103

For Part 1 see MS2

Cylindrical Algebraic Decomposition (CAD) was invented by Collins (1975) to solve problems of Quantifier Elimination. Although the worst case is doubly exponential in the number of variables, it has proved to be a practical method in many cases. There have been many practical improvements in the CAD algorithm in the intervening period, as well as a completely different approach based on regular chains. In addition, we know much more about how to adapt CAD to the specific problem being studied. This symposium will review recent developments and discuss the still-open problems.

Organizer: Changbo Chen
University of Western Ontario, Canada

Organizer: James Davenport
University of Bath, United Kingdom

Organizer: Marc Moreno Maza
University of Western Ontario, Canada

10:00-10:25 An Incremental Algorithm for Computing Cylindrical Algebraic Decomposition and Its Application to Quantifier Elimination
Changbo Chen and Marc Moreno Maza, University of Western Ontario, Canada

10:30-10:55 An Application of Quantifier Elimination to Automatic Parallelization of Computer Programs
Marc Moreno Maza and Changbo Chen, University of Western Ontario, Canada

11:00-11:25 Turning CAD Upside Down
Dejan Jovanovic, New York University, USA; Leonardo de Moura, Microsoft Research, USA

11:30-11:55 Relative Equilibria in the Four-Vortex Problem with Two Pairs of Equal Vorticities
Manuele Santoprete, Wilfrid Laurier University, Canada; Marshall Hampton, University of Minnesota, Duluth, USA; Gareth Roberts, College of the Holy Cross, USA

Friday, August 2

MS27

Algorithms in Numerical Algebraic Geometry - Part I of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A104

For Part 2 see MS40

Numerical algebraic geometry computes and manipulates the solution set of systems of polynomial equations using numerical techniques. This minisymposium will focus on new algorithmic developments and implementation of these algorithms in numerical algebraic geometry.

Organizer: Jonathan Hauenstein
North Carolina State University, USA

10:00-10:25 Applications of Numerical Elimination Theory
Jonathan Hauenstein, North Carolina State University, USA

10:30-10:55 Projective Path Tracking for Homotopy Continuation Methods
Tianran Chen and Tien-Yien Li, Michigan State University, USA

11:00-11:25 On Massively Parallel Algorithms to Track One Path of a Polynomial Homotopy
Jan Verschelde, Genady Yoffe, and Xiangcheng Yu, University of Illinois, Chicago, USA

11:30-11:55 Numerically Computing Polynomial Images of Algebraic Sets with Applications
Noah Daleo and Jonathan Hauenstein, North Carolina State University, USA

12:00-12:25 Numerical Algebraic Intersection Using Regeneration
Charles Wampler, General Motors Research Laboratories, USA; Jonathan Hauenstein, North Carolina State University, USA

Friday, August 2

MS28

Toric Geometry, Lattice Points, and Applications - Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A201

For Part 1 see MS6

The interplay of algebraic geometry with convex and polyhedral geometry has been an on-going success story for over 30 years. While toric varieties have been established by now as fascinating objects of study and important examples of higher-dimensional varieties, in particular their symbiosis with lattice polytopes continues to fuel interdisciplinary research. In this minisymposium we will focus on (1) combinatorial and computational aspects of lattice points, such as Ehrhart theory and lattice point enumeration; and (2) lattice points occurring as invariants of toric varieties.

Organizer: Ivan Soprunov
Cleveland State University, USA

Organizer: Benjamin T. Nill
Case Western Reserve University, USA

10:00-10:25 K-Theory of Toric Varieties Revisited
Joseph Gubeladze, San Francisco State University, USA

10:30-10:55 The Hodge Theory of Hypersurfaces
Eric Katz, University of Waterloo, Canada

11:00-11:25 Frobenius Splitting and Toric Varieties
Milena Hering, University of Edinburgh, United Kingdom; Kevin Tucker, Princeton University, USA

11:30-11:55 Syzygies and Singularities of Tensor Product Surfaces of Bidegree (2,1)
Hal Schenck, University of Illinois, USA; A. Seceleanu, University of Nebraska, USA; J. Validashti, University of Illinois, USA

12:00-12:25 Equivariant Vector Bundles on T-Varieties
Nathan Ilten, University of California, Berkeley, USA

Friday, August 2

MS29

Post-Quantum Cryptography - Part I of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A202

For Part 2 see MS54

The most commonly used public-key cryptosystems on the internet today are RSA and ECC. Both of these schemes become trivially breakable once sufficiently large quantum computers are built. Post-Quantum Cryptography studies cryptosystems that remain secure against attacks by quantum computers. Particular areas of interest include public-key cryptosystems based on lattices, error-correcting codes, and multivariate quadratic equations.

Organizer: Tanja Lange
Technische Universiteit Eindhoven, The Netherlands

Organizer: Dan Bernstein
University of Illinois at Chicago and Technische Universiteit Eindhoven, the Netherlands

10:00-10:25 Overview of Post-Quantum Cryptography
Tanja Lange, Technische Universiteit Eindhoven, The Netherlands

10:30-10:55 Degree of Regularity of Hfe Family of Cryptosystems
Jintai Ding, University of Cincinnati, USA

11:00-11:25 On the Practical and Asymptotic Complexity of Solving Generic Systems of Equations
Bo-Yin Yang, Academia Sinica, China

11:30-11:55 Degree of Regularity of Generalized HFE Cryptosystems
Timothy Hodges, University of Cincinnati, USA

Friday, August 2

MS30

Applications to Image Processing and Shape Analysis - Part II of III

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A203

For Part 1 see MS18
For Part 3 see MS43

Methods from algebraic geometry and algebraic topology lie at the foundations of many existing algorithms in image processing and shape analysis. The talks in the proposed minisymposium will be devoted both to newly developed results in this area and to the discussion of open problems.

Organizer: Irina Kogan
North Carolina State University, USA

Organizer: Facundo Memoli
University of Adelaide, Australia

10:00-10:25 Persistence Barcode Signatures for Image Classification
Gunnar E. Carlsson, Stanford University, USA

10:30-10:55 Stability of Persistence Spaces for Vector-Valued Functions
Claudia Landi, Universita degli Studi di Modena e Reggio Emilia, Italy; Andrea Cerri, IMATI-CNR, Italy

11:00-11:25 Persistence Simplification with Iterated Morse Complex Decomposition
Pawel Dlotko, University of Pennsylvania, USA

11:30-11:55 Image Segmentation with Topological Information -- Yet Another Application of Persistent Homology
Chao Chen, Rutgers University, USA

12:00-12:25 Metric Geometry and Persistent Homology
Facundo Memoli, University of Adelaide, Australia

Friday, August 2

MS31

Algebro-geometric Approaches to Tensor Spaces, Tensor Decomposition, and Identifiability - Part II of III

10:00 AM-11:30 AM

Room:Andrew G. Clark Building – A204

For Part 1 see MS7
For Part 3 see MS56

This session is concerned with algebraic and geometric approaches to problems related to: 1) spaces of tensors; 2) various notions of ranks for tensors; 3) tensor decomposition; 4) identifiability; and 5) representation theory and tensors.

Organizer: Hirotachi Abo
University of Idaho, USA

Organizer: Luke Oeding
University of California, Berkeley, USA

Organizer: Giorgio Ottaviani
University of Firenze, Italy

Organizer: Chris Peterson
Colorado State University, USA

10:00-10:25 A Set-theoretic Proof of the Salmon Conjecture
Elizabeth Gross and Shmuel Friedland, University of Illinois, Chicago, USA

10:30-10:55 Tangential Varieties of Segre-Veronese Varieties
Claudiu Raicu, Princeton University, USA; Luke Oeding, University of California, Berkeley, USA

11:00-11:25 Extremal Betti Tables
Christine Berkesch, Duke University, USA; Daniel Erman, University of Michigan, USA; Manoj Kummini, Chennai Mathematical Institute, India

Friday, August 2

MS32

Software for Algebraic Geometry: Macaulay2 - Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A205

For Part 1 see MS8

Macaulay2 is a software system devoted to supporting research in algebraic geometry and commutative algebra. Developed by Daniel Grayson and Michael Stillman, it has played a significant role in many branches of applied algebraic geometry. Experiments with this system continue to be particularly valuable in collecting heuristic evidence, establishing patterns, formulating conjectures, and exhaustively exploring examples. As an added benefit, a computational perspective often leads to deeper theoretical insights. The talks in this minisymposium will showcase the range of new research that advances, exploits, or promotes Macaulay2.

Organizer: Gregory G. Smith
Queen's University, Canada

10:00-10:25 Inferring Biologically Relevant Models: Nested Canalyzing Functions
Franziska Hinkelmann, Ohio State University, USA

10:30-10:55 Lozenge Tilings and the Weak Lefschetz Property
David Cook II, University of Notre Dame, USA

11:00-11:25 Computer-aided Unirationality Proofs
Florian Geiß and Frank-Olaf Schreyer, Universität des Saarlandes, Germany

11:30-11:55 Algebraic Statistics and Macaulay2: Running Markov Chains on Network Fibers
Elizabeth Gross, University of Illinois, Chicago, USA; *Sonja Petrovic*, Pennsylvania State University and Illinois Institute of Technology; Despina Stasi, Pennsylvania State University, USA

12:00-12:25 Groebner-free Computations with Binomial Ideals
Thomas Kahle, TU München, Germany

Friday, August 2

MS33

Real Algebraic Geometry and Optimization - Part III of III

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A207

For Part 2 see MS21

The minisymposium presents recent developments in the interplay of real algebraic geometry and optimization. Topics include positive polynomials, sums of squares, semidefinite programming, polynomial optimization, linear and semidefinite relaxations, symmetries, and spectrahedra.

Organizer: Greg Blekherman
Georgia Institute of Technology, USA

Organizer: Cordian Riener
Aalto University, Finland

Organizer: Thorsten Theobald
Johann Wolfgang Goethe University, Frankfurt am Main, Germany

10:00-10:25 On Elliptesque and Hyperbolesque Curves
Bruce Reznick, University of Illinois at Urbana-Champaign, USA

10:30-10:55 Polynomial-Sized Semidefinite Representations of Derivative Relaxations of Spectrahedral Cones
James Saunderson and Pablo A. Parrilo, Massachusetts Institute of Technology, USA

11:00-11:25 Polytopes with Minimal Semidefinite Representations
Joao Gouveia, Universidade de Coimbra, Portugal; Richard Robinson and Rekha Thomas, University of Washington, USA

11:30-11:55 Realizing Hyperbolicity Cones As Spectrahedra and Their Projections
Tim Netzer, University of Leipzig, Germany

Friday, August 2

MS34

Sparse Models, Interpolation and Polynomials - Part I of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – C146

For Part 2 see MS59

The ability to extract, model and manipulate the underlying structure or support of a "hidden" sparse object has seen exciting recent developments. New sparse interpolation algorithms are able to extract structural features through a remarkably small number of probes, even in the presence of noise and outlier errors. An important synergy for recovery is developing between algebraic algorithms for sparse polynomials, signal processing, and error correcting coding. Prony-like methods are competing with compressed sensing techniques to obtain numerically robust methods with low complexity. Applications include medical signal processing and symbolic-numeric solution of polynomial equations.

Organizer: Mark Giesbrecht
University of Waterloo, Canada

Organizer: Erich Kaltofen
North Carolina State University, USA

Organizer: Wen-shin Lee
University of Antwerp, Belgium

10:00-10:25 New Approaches to Sparse Interpolation and Signal Reconstruction
Mark Giesbrecht, University of Waterloo, Canada

10:30-10:55 Combining Tricks for Exact Sparse Interpolation
Daniel S. Roche, United States Naval Academy, USA

11:00-11:25 Sparse Interpolation with Noise and Outliers
Clément Pernet, Université de Grenoble I, France

11:30-11:55 Recursive Interpolation of a Sparse Polynomial Given by a Straight-Line Program
Andrew Arnold and Mark Giesbrecht, University of Waterloo, Canada; Dan Roche, United States Naval Academy, USA

12:00-12:25 Numerical Issues with Sparse Interpolation
George Labahn, University of Waterloo, Canada

Friday, August 2

MS35

Complexity of Solving Polynomial Systems in Several Variables

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 106

Solving polynomial systems in several variables is one of the most classical problems of mathematics. In particular, the design of efficient algorithms for solving polynomial systems is a challenge in the recent history of computational mathematics. This minisymposium consists of four talks treating several aspects of the complexity of algorithms solving polynomial equations. Eric Schost considers the problem of solving symbolically bivariate systems. Teresa Krick addresses the complexity of numerically counting the real solutions of real systems. Maurice Rojas explores the associated tropical geometry. Marc Giusti treats the complexity of real solving studying the geometry associated to a finite group.

Organizer: Guillermo Matera
Universidad Nacional de General San Martin, Argentina

Organizer: Luis Miguel Pardo
Universidad de Cantabria, Spain

10:00-10:25 A Numerical Algorithm for Zero Counting
Felipe Cucker, City University of Hong Kong, Hong Kong; *Teresa Krick*, Universidad de Buenos Aires, Argentina; Gregorio Malajovich, UFRJ, Brazil; Mario Wschebor, Universidad de la República, Uruguay

10:30-10:55 How Far Are Archimedean Tropical Varieties from Amoebae?
J. Maurice Rojas, and Martin Avendano, Texas A&M University, USA

continued in next column

11:00-11:25 On the Complexity of Solving Bivariate Polynomial Systems
Esmaeil Mehrabi, Western University, Canada; *Eric Schost*, University of Western Ontario, Canada; Romain Lebreton, Universite de Montpellier II, France

11:30-11:55 On the Complexity of Computing the Dimension of Semi-algebaic Sets
Mohab Safey El Din, Université Paris 6, France; Elias Tsigaridas, INRIA and Universite Pierre et Marie Curie, France

Friday, August 2

MS36

See Saturday morning

MS37

Algorithms in Real Algebraic Geometry and its Applications - Part I of III

10:00 AM-12:30 PM

Room:Willard O. Eddy Hall - 108

For Part 2 see MS49

Algorithms for solving of polynomial systems are of great importance both in theory and practice. Usually, the end-user seeks for information on the real solutions. Typical questions are deciding the existence of real solutions, isolating them whenever they exist, answer connectivity queries, perform quantifier elimination over the reals, etc. There are effective variants of the core topics studied in real algebraic geometry. However, the complexity of solving most of these problems is at least singly exponential in the number of variables. Hence, the development of the fastest possible algorithms within the best possible complexity class that lead to efficient implementations is of first importance.

Organizer: Elias Tsigaridas
INRIA Sophia Antipolis, France

Organizer: Mohab Safey El Din
Université Paris 6, France

10:00-10:25 Sparse Interpolation and Error-Correcting Coding
Erich Kaltofen, North Carolina State University, USA

10:30-10:55 New Algorithms for Computing Roadmaps in Smooth Bounded Real Algebraic Sets
Mohab Safey El Din, Université Paris 6, France; *Eric Schost*, University of Western Ontario, Canada

continued on next page

Friday, August 2

MS37

Algorithms in Real Algebraic Geometry and its Applications - Part I of III

continued

11:00-11:25 Hybrid Methods for Exact Geometric Computation
Michael Sagraloff, Max Planck Institute for Informatics, Germany

11:30-11:55 Automatic Natural Language Mathematical Problem Solving Using Real Quantifier Elimination
Hirokazu Anai, Kyushu University, Japan; Hidenao Iwane, Fujitsu Laboratories LTD., Japan; Takuya Matsuzaki and Norico Arai, National Institute of Informatics, Japan

12:00-12:25 Constructing a Single Cell in a Cylindrical Algebraic Decomposition
Christopher Brown, United States Naval Academy, USA

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Friday, August 2

IP4

Numerics and Algebraic Geometry

2:00 PM-3:00 PM

Room:Andrew G. Clark Building – A101

Chair: Andrew Sommese, University of Notre Dame, USA

Numerical methods have increasingly proven to be both helpful and necessary in Algebraic Geometry. Conversely geometrical and algebraic tools have led to new algorithms providing advances in more applied areas such as engineering and medical science. We will present a few examples showing this fruitful interplay. Classical theory from algebraic geometry can be used in Kinematics. Established tools form topology apply to give a numerical cell-decomposition of solution sets. Numerical methods, on the other hand, are essential tools for efficient algorithms to compute invariants of algebraic varieties, like Chern classes or the Euler characteristics. The talk is based on joint work with Besana, Eklund, Hauenstein, Peterson, Sommese and Wampler.

Sandra Di Rocco
KTH Stockholm, Sweden

Coffee Break

3:00 PM-3:30 PM

Room:Andrew G. Clark Building – Clark A Wing

Friday, August 2

MS38

Algebraic Aspects of Biochemical Reaction Networks - Part II of II

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A102

For Part 1 see MS13

Many scientific disciplines use reaction networks to represent and study interactions among species, be they chemical species in (bio) chemistry or living organisms in ecology or epidemiology. It has long been recognized that qualitative properties of reaction networks must be understood as independently of kinetic parameters as possible. This is because rates are usually unknown or poorly known, and simulations alone cannot prove asymptotic properties. Algebra and algebraic geometry are increasingly making important contributions, particularly regarding the multiplicity and stability of equilibria. This minisymposium will be a venue for exchanges on the latest developments in this area.

Organizer: Gilles Gnacadja
Amgen Inc., USA

Organizer: Anne Shiu
University of Chicago, USA

3:30-3:55 Nontrivial Bounds for Steady State Concentrations
Alicia Dickenstein and Mercedes Pérez Millán, Universidad de Buenos Aires, Argentina

4:00-4:25 Enzymatic Networks and Toric Steady States
Mercedes Perez Millan and Alicia Dickenstein, Universidad de Buenos Aires, Argentina

4:30-4:55 Zero-Eigenvalue Turing Instability in General Chemical Reaction Networks
Maya Mincheva, Northern Illinois University, USA; Gheorghe Craciun, University of Wisconsin, Madison, USA

continued on next page

5:00-5:25 Ruling out Hopf Bifurcations in Systems of Interacting Elements
Casian Pantea, Imperial College London, United Kingdom; Murad Banaji, University of Portsmouth, United Kingdom; David Angeli, Imperial College London, United Kingdom

Friday, August 2

MS39

Hypergeometric Differential Equations and Statistics

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A103

We are interested in statistics and special functions. In particular, we want to focus on the holonomic gradient method and related topics. The holonomic gradient method (HGM) gives a new method in statistics and give a new light to the classical study of statistics and special functions. It gives new algorithms for the maximal likelihood estimation and for the numerical evaluation of normalizing constants of unnormalized probability distributions. Theories, algorithms, and systems in combinatorial commutative algebra, D-modules, numerical analysis, and hypergeometric differential equations in several variables are used in the HGM. The HGM also raises several new problems in these areas and also gives motivations of developing new systems.

Organizer: Nobuki Takayama
Kobe University, Japan

Organizer: Kena Nishiyama
Shizuoka Prefecture University, Japan

Organizer: Takayuki Hibi
Osaka University, Japan

3:30-3:55 Holonomic Gradient Method for Multivariate Normal Distribution Theory
Akimichi Takemura, Tokyo University, Japan

4:00-4:25 Holonomic Gradient Descent in Directional Statistics
Tomonari Sei, Keio University, Japan

4:30-4:55 A-Hypergeometric Systems
Uli Walther, Purdue University, USA

5:00-5:25 A-Hypergeometric Systems and Estimation Problems in Statistics
Takayuki Hibi, Osaka University, Japan; *Kenta Nishiyama*, Shizuoka Prefecture University, Japan; Nobuki Takayama, Kobe University, Japan

Friday, August 2

MS40

Algorithms in Numerical Algebraic Geometry - Part II of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A104

For Part 1 see MS27
Numerical algebraic geometry computes and manipulates the solution set of systems of polynomial equations using numerical techniques. This minisymposium will focus on new algorithmic developments and implementation of these algorithms in numerical algebraic geometry.

Organizer: Jonathan Hauenstein
North Carolina State University, USA

3:30-3:55 Polynomial Systems and Algebraic Number Fields
Andrew Sommese, University of Notre Dame, USA

4:00-4:25 Solving Polynomial Systems in Noether Position with Puiseux Series
Danko Adrovic and Jan Verschelde, University of Illinois, Chicago, USA

5:00-5:25 Bifurcation Analysis and Continuation Methods in Celestial Mechanics
Randy Paffenroth, Numerica, USA

5:30-5:55 Application of Numerical Algebraic Geometry to Geometric Data Analysis
Brent R. Davis, Daniel J. Bates, Chris Peterson, Michael Kirby, and Justin Marks, Colorado State University, USA

Friday, August 2

MS41

Arithmetic Geometry - Part III of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A201

For Part 2 see MS16

The minisymposium addresses current topics in computational arithmetic geometry, including abelian surfaces, del Pezzo surfaces, cohomology of varieties, and arithmetic of Jacobians.

Organizer: Rachel Pries
Colorado State University, USA

Organizer: Stefan Erickson
Colorado College, USA

3:30-3:55 Arithmetic of Jacobians over Function Fields
Lisa Berger, State University of New York, Stony Brook, USA

4:00-4:25 Computing L-Series of Low Genus Curves
Andrew V. Sutherland, Massachusetts Institute of Technology, USA; David Harvey, University of New South Wales, Australia

4:30-4:55 The Local-global Principle for Divisibility in the Cohomology of Elliptic Curves
Brendan Creutz, University of Sydney, Australia

5:00-5:25 Effective One-Dimensional Infrastructure in Function Fields of Arbitrary Degree
Renate Scheidler, University of Calgary, Canada

5:30-5:55 Canonical Heights in Arithmetic Geometry and Arithmetic Dynamics
Joseph H. Silverman, Brown University, USA

Friday, August 2

MS42

Coding Theory and Geometry - Part I of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A202

For Part 2 see MS67

Topics include codes constructed with algebraic curves, linear codes over fields and over rings, and subspace codes, with applications to polar coding, network coding and index coding.

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

Organizer: Elisa Gorla
University of Neuchatel, Switzerland

Organizer: Joachim Rosenthal
Universität Zürich, Switzerland

3:30-3:55 List Decoding of Subspace Codes
Anna-Lena Trautmann, University of Zurich, Switzerland; *Joachim Rosenthal*, Universität Zürich, Switzerland

4:00-4:25 On q-Ary Polar Coding
Gretchen L. Matthews, Clemson University, USA

4:30-4:55 On Polar Coding with Algebraic Geometric Kernels
Sarah Anderson, Clemson University, USA

5:00-5:25 The Minimum Distance and the Index of Nilpotency
Stefan Tohaneanu, University of Western Ontario, Canada

5:30-5:55 Smooth Models for the Deligne-Lusztig Curves
Iwan Duursma, University of Illinois at Urbana-Champaign, USA; Abdulla Eid, University of Illinois, USA

Friday, August 2

MS43

Applications to Image Processing and Shape Analysis - Part III of III

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A203

For Part 2 see MS30

Methods from algebraic geometry and algebraic topology lie at the foundations of many existing algorithms in image processing and shape analysis. The talks in the proposed minisymposium will be devoted both to newly developed results in this area and to the discussion of open problems.

Organizer: Irina Kogan
North Carolina State University, USA

Organizer: Facundo Memoli
University of Adelaide, Australia

3:30-3:55 Object/Image Equations for Object Recognition, Shape Analysis, and Statistics.
Peter F. Stiller, Texas A&M University, USA

4:00-4:25 Simplified Morse Skeletons from Digital Images
Vanessa Robins, Olaf Delgado-Friedrichs, and Adrian Sheppard, Australian National University, Australia

4:30-4:55 Using Gaussian-Weighted Graph Laplacian in Geometric Shape Processing
Yusu Wang, Ohio State University, USA

5:00-5:25 Object Image Correspondence for Algebraic Curves under Projections.
Joseph Burdis, *Irina Kogan*, and Hoon Hong, North Carolina State University, USA

Friday, August 2

MS44

Algebraic Geometry of Tensor Decompositions - Part II of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A204

For Part 1 see MS19
For Part 3 see MS69

We are interested in various aspects of tensor decompositions studied under the light of algebraic geometry --- complex, real, convex, and tropical.

Organizer: Lek-Heng Lim
University of Chicago, USA

3:30-3:55 Ranks and Nuclear Norms of Tensors
Harm Derksen, University of Michigan, USA

4:00-4:25 Higher Secants of Sato's Grassmannian
Jan Draisma, Technische Universiteit Eindhoven, The Netherlands

4:30-4:55 Writing Forms as Sums of Higher Powers of Lower Degree Forms
Bruce Reznick, University of Illinois at Urbana-Champaign, USA

5:00-5:25 Equations of Secant Varieties
Adam Ginensky, University of Chicago, USA

5:30-5:55 On Waring's Problem for Systems of Skew-Symmetric Forms
Hirotachi Abo and Jia Wan, University of Idaho, USA

Friday, August 2

MS45

Computations and Effective Bounds in Commutative Algebra - Part II of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A205

For Part 1 see MS20

In this minisymposium, we propose to bring together researchers both which are developing software for computations in commutative algebra and algebraic geometry, and also researchers who are developing theoretical bounds on what might be computed.

Organizer: Claudiu Raicu
Princeton University, USA

Organizer: Karl Schwede
Pennsylvania State University, USA

Organizer: Uli Walther
Purdue University, USA

3:30-3:55 Combinatorial Degree Bound for Toric Ideals of Hypergraphs
Elizabeth Gross, University of Illinois, Chicago, USA; Sonja Petrovic, Pennsylvania State University and Illinois Institute of Technology

4:00-4:25 Hyperdeterminants of Polynomials
Luke Oeding, University of California, Berkeley, USA

4:30-4:55 Numerical Computations and Galois Groups in Schubert Calculus
Abraham Martin del Campo, IST, Austria

5:00-5:25 Software for Computing Multiplier Ideals
Zach Teitler, Boise State University, USA

5:30-5:55 Comparison of Symbolic and Ordinary Powers of Ideals
Wenbo Niu, Purdue University, USA

Friday, August 2

MS46

On Coppersmith's Heuristic Algorithm for Finding Roots of Multivariate Polynomials

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A207

In 1996, Don Coppersmith introduced an algorithm relying on lattice reduction to disclose all small roots of a polynomial. When the polynomial is univariate over Z/nZ (n not necessarily prime) or bivariate over Z, the algorithm is rigorous. But when it has more variables, it relies on the heuristic assumption that several linearly independent polynomials obtained by the lattice reduction process are algebraically independent. Coppersmith's method has been extensively used in cryptanalysis, but also in coding theory and in computer arithmetic. The aim of the mini-symposium is to describe the state of the art on proving/circumventing the heuristic assumption.

Organizer: Damien Stehle
Ecole Normale Superieure de Lyon, France

3:30-3:55 An Introduction to Coppersmith's Theorem and its Applications
Mehdi Tibouchi, NTT Secure Platform Laboratories, Japan

4:00-4:25 The Heuristic Coppersmith Technique from a Computer Algebra Point of View
Guénaël Renault, Université Pierre et Marie Curie, France

4:30-4:55 Toward a Rigorous Variation of Coppersmith's Algorithm on Three Variables
Aurélie Bauer, ANSSI, France

5:00-5:25 Polynomial Analogues of Coppersmith's Method, with Applications to List-decoding of Error-correcting Codes
Nadia Heninger, Microsoft Research, USA

Friday, August 2

MS47

Symbolic-numerical Methods for Approximate Polynomial Interpolation

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – C146

Recently, in applied mathematics polynomials have been increasingly employed. One of the reasons for this choice undoubtedly falls within the large development of algorithms/ software for computing with polynomials. In this minisymposium we consider the problem of approximate polynomial interpolation, i.e. the problem of finding polynomials whose affine varieties lie as close as possible to given points. A dual problem is also considered, that is the fitting of an approximate polynomial locally to a root of certain multiplicity structure. Our approaches always combine methods of commutative and numerical linear algebra; they find applications in different areas, including computational geometry, celestial mechanics and image detection.

Organizer: Angelos Mantzaflaris
RICAM, Austrian Academy of Sciences, Austria

Organizer: Maria-Laura Torrente
University of Genova, Italy

3:30-3:55 Implicitization by Interpolation: Symbolic and Numerical Methods
Tatjana Kalinka, National and Kapodistrian University of Athens, Greece

4:00-4:25 Coping with Singular Isolated Zeros of Polynomial Systems Using Symbolic perturbations
Angelos Mantzaflaris, RICAM, Austrian Academy of Sciences, Austria; Bernard Mourrain, INRIA Sophia Antipolis, France

continued in next column

4:30-4:55 Vanishing Ideals of Limited Precision Points
Maria-Laura Torrente, University of Genova, Italy

5:00-5:25 Interpolation and Ehrhart Theory
Zafeirakis Zafeirakopoulos, Johannes Kepler University Linz, Austria

Friday, August 2

MS48

Applied and Computational Topology - Part II of III

3:30 PM-6:00 PM

Room:Willard O. Eddy Hall - 107

For Part 1 see MS23
For Part 3 see MS74
Applied and computational topology is a vibrant research area that's gained momentum over the last decade. A core aim is data analysis by way of understanding the shape of the data. To devise robust techniques, researchers are interested in questions of stability of topological descriptors. To process modern datasets, the field is interested in efficient algorithms. The goal of the minisymposium is to create a forum for young researchers to present recent developments in the field.

Organizer: Dmitriy Morozov
Lawrence Berkeley National Laboratory, USA

Organizer: Mikael Vejdemo Johansson
University of St. Andrews, United Kingdom

3:30-3:55 Kernel Distance for Geometric Inference
Bei Wang and Jeff Phillips, University of Utah, USA

4:00-4:25 A Continuous Mean for Sets of Persistence Diagrams
Elizabeth Munch, Duke University, USA

4:30-4:55 Generalized Interleavings and Weak Laws of Large Numbers for 2-D Persistent Homology
Michael Lesnick, Institute for Advanced Study, USA

5:00-5:25 Sheaves, Cosheaves and Applications
Justin Curry, University of Pennsylvania, USA

5:30-5:55 Measuring the Stability of Intersections to C^0 Perturbations
Amit Patel, Rutgers University, USA

Friday, August 2

MS49

Algorithms in Real Algebraic Geometry and its Applications - Part II of III

3:30 PM-5:30 AM

Room:Willard O. Eddy Hall - 108

For Part 1 see MS37
For Part 3 see MS62

Algorithms for solving of polynomial systems are of great importance both in theory and practice. Usually, the end-user seeks for information on the real solutions. Typical questions are deciding the existence of real solutions, isolating them whenever they exist, answer connectivity queries, perform quantifier elimination over the reals, etc. There are effective variants of the core topics studied in real algebraic geometry. However, the complexity of solving most of these problems is at least singly exponential in the number of variables. Hence, the development of the fastest possible algorithms within the best possible complexity class that lead to efficient implementations is of first importance.

Organizer: Elias Tsigaridas
INRIA Sophia Antipolis, France

Organizer: Mohab Safey El Din
Université Paris 6, France

3:30-3:55 Khovanskii-Rolle Continuation for Real Solutions
Frank Sottile, Texas A&M University, USA; Daniel J. Bates, Colorado State University, USA

4:00-4:25 An Algorithm to Compute the Dimension of Real Algebraic Sets
Mohab Safey El Din, Université Paris 6, France; *Elias Tsigaridas*, INRIA Sophia Antipolis, France

continued in next column

4:30-4:55 Computing Critical Points with Gröbner Bases: Complexity and Applications
Pierre-Jean Spaenlehauer, University of Western Ontario, Canada; Jean-Charles Faugère, INRIA Paris-Rocquencourt, France; Mohab Safey El Din, Université Paris 6, France

5:00-5:25 Discriminants and Applications
Alicia Dickenstein, Universidad de Buenos Aires, Argentina; Ioannis Z. Emiris and *Anna Karasoulou*, National and Kapodistrian University of Athens, Greece

Friday, August 2

CP2

3:30 PM-5:00 PM

Room:Willard O. Eddy Hall - 106

Chair: To Be Determined

3:30-3:55 List Decoding of Repeated Codes
Michael E. O'Sullivan, San Diego State University, USA; Fernando Hernando, Universidad Jaume I, Spain; Diego Ruano, Aalborg University, Denmark

4:00-4:25 Doubly Adapted Bases for the Symmetric Group
Michael E. Orrison, Harvey Mudd College, USA; Michael Hansen, NA; Masanori Koyama, University of Wisconsin, Madison, USA

4:30-4:55 Elegant Expressions and Formulae for Riemann Zeta, Dirichlet Beta, Euler Numbers and Other Mathematical Functions
Michael A. Idowu, University of Abertay, Dundee, UK

Saturday, August 3

Registration

7:30 AM-5:00 PM

Room:Andrew G. Clark Building – Clark A Wing

Announcements

8:20 AM-8:30 AM

Room:Andrew G. Clark Building – Clark A Wing

Saturday, August 3

IP5

Algebraic Geometry in System Biology

8:30 AM-9:30 AM

Room:Andrew G. Clark Building – A101

Chair: Seth Sullivant, North Carolina State University, USA

Systems biology aims to understand complex systems and the mechanisms that are responsible for specific behaviors, such as multi-stationarity or oscillation. Typical mathematical models of biological systems produce polynomial systems of equations. In recent years tools from algebraic geometry are increasingly being applied to understand such polynomial systems and extract information that are relevant for the design of experiments/systems and the analysis of experimental data. In this talk I will review recent results, and discuss some of the challenges we are facing.

Carsten Wiuf
University of Copenhagen, Denmark

Coffee Break

9:30 AM-10:00 AM

Room:Andrew G. Clark Building – Clark A Wing

Saturday, August 3

MS36

Symbolic Combinatorics - Part II of III

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 107

For Part 1 see MS11
For Part 3 see MS61

In recent years algorithms and software have been developed that allow researchers to discover and verify combinatorial identities as well as understand analytic and algebraic properties of generating functions. The interaction of combinatorics and symbolic computation has had a beneficial impact on both fields. This minisymposium will feature 12 speakers describing recent research combining these areas.

Organizer: Manuel Kauers
RISC, Austria

Organizer: Michael Singer
North Carolina State University, USA

10:00-10:25 Computing Decompositions of Hypergeometric Terms
Ziming Li, Chinese Academy of Sciences, China

10:30-10:55 A Combinatorial Approach to Lattice Path Asymptotics
Marni Mishna, Simon Fraser University, Canada

11:00-11:25 Computing Hypergeometric Solutions of Second Order Differential Equations with Five Singularities
Vijay Kunwar and Mark van Hoeij, Florida State University, USA

11:30-11:55 Holonomic Integer Sequences and Transcendental Numbers
Mark van Hoeij, Florida State University, USA

Saturday, August 3

MS50

Formulas in Interpolation - Part I of III

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A102

For Part 2 see MS63

This minisymposium focuses on interpolation in Computational Algebra and Algebraic Geometry. Interpolation has proven to be a very effective tool for both computational and also theoretical purposes. From reconstructing defining polynomials of algebraic varieties to giving closed formulas for these polynomials, the goal of the meeting will be to understand the connections between the geometric and the algebraic counterpart of interpolation, and also to explore generalized interpolation methods (such as Birkhoff interpolation and its multivariate versions). Specific topics included: -- closed formulas in interpolation -- solvability (of Hermite-Birkhoff type) interpolation problems -- rational interpolation problems -- relations to the theory of subresultants and Schur functions -- Alexander-Hirschowitz type theorems

Organizer: Carlos D'Andrea
Universitat de Barcelona, Spain

Organizer: Teresa Krick
Universidad de Buenos Aires, Argentina

Organizer: Agnes Szanto
North Carolina State University, USA

10:00-10:25 Introduction and Overview of the Topic Area 'Formulas in Interpolation'
Carlos D'Andrea, Universitat de Barcelona, Spain

10:30-10:55 Polynomial Algebra for Birkhoff Interpolants
John C. Butcher, University of Auckland, New Zealand; Rob M. Corless, University of Western Ontario, Canada; *Laureano Gonzalez-Vega*, Universidad de Cantabria, Spain

continued in next column

11:00-11:25 An Algorithm for Evaluation and Interpolation in Higher Dimensions
Joris van der Hoeven, Ecole Polytechnique, France; *Eric Schost*, University of Western Ontario, Canada

11:30-11:55 Sylvester Double Sums and Divided Differences
Aviva Szpirglas, Université de Poitiers, France

Saturday, August 3

MS51

Singular Learning Theory

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A103

Singular learning theory is concerned with problems of statistical model selection when one or more of the considered models are singular. Here, a statistical model is singular if its Fisher-information matrix can fail to be invertible. The examples of singular models that arise in practice generally feature algebraic structure that allows one to analyze their behavior using algebraic geometric techniques for resolution of singularities. The speakers in this minisymposium will present new theoretical results and practical methods that build on this connection between algebraic geometry and statistics.

Organizer: Mathias Drton
University of Washington, USA

10:00-10:25 Resolution of Singularities and Statistical Model Evaluation
Sumio Watanabe, Tokyo Institute of Technology, Japan

10:30-10:55 A Bayesian Information Criterion for Singular Models
Mathias Drton, University of Washington, USA; Martyn Plummer, International Agency for Research on Cancer, France

11:00-11:25 Asymptotic Inference for Gaussian Hidden Tree Models
Piotr Zwiernik, University of California, Berkeley, USA

11:30-11:55 Singular Learning Theory and Causal Inference
Shaowei Lin, A*STAR Computational Resource Centre, Singapore; *Caroline Uhler*, Institute of Science and Technology, Austria; Bernd Sturmfels, University of California, Berkeley, USA; Peter Buehlmann, ETH Zürich, Switzerland

Saturday, August 3

MS52

Applications of Numerical Algebraic Geometry - Part I of II

10:00 AM-11:30 AM

Room:Andrew G. Clark Building – A104

For Part 2 see MS65

This minisymposium will feature experts in the various applications of numerical algebraic geometry both within and outside algebraic geometry. Approximately half of the speakers will focus on applications within algebraic geometry, such as fast parameter homotopies, exceptional mechanisms. The other half of the speakers will focus on the use of continuation methods in problems outside numerical algebraic geometry, in areas such as nonlinear PDEs, tumor growth models, and maximum likelihood estimation. The common thread between all talks will be the use of numerical algebraic geometry methods and software.

Organizer: Wenrui Hao
University of Notre Dame, USA

10:00-10:25 Applying Fiber Products to Polynomial Maps and the Planar Pentad
Eric Hanson and Dan Bates, Colorado State University, USA; Jon Hauenstein, North Carolina State University, USA; Charles Wampler, General Motors Research Laboratories, USA

10:30-10:55 Numerical Methods for Highly Structured Polynomial Systems Coming from Magnetism
Daniel J. Bates, Colorado State University, USA

11:00-11:25 Numerical Determination of Witness Points on Real Solution Components of Polynomial and Differential Polynomial Equations
Wenyuan Wu, Chinese Academy of Sciences, China; Greg Reid, University of Western Ontario, Canada

Saturday, August 3

MS53

Approximation Theory, Geometric Modeling, and Algebraic Geometry - Part I of III

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A201

For Part 2 see MS66

Piecewise-defined polynomials play an important role in both Approximation Theory and in Geometric Modeling. This not only connects these fields, but enables the use of methods from Algebraic Geometry and Commutative Algebra to be applied to problems arising in Geometric Modeling and Approximation Theory. This minisymposium will feature work highlighting interactions between these fields.

Organizer: Luis Garcia
Sam Houston State University, USA

Organizer: Frank Sottile
Texas A&M University, USA

10:00-10:25 Syzygies and Singularities of Tensor Product Surfaces
Alexandra Seceleanu, University of Nebraska, Lincoln, USA; Hal Schenck, University of Illinois, USA; Javid Validashti, University of Illinois at Urbana-Champaign, USA

10:30-10:55 The Schenck-Stiller Conjecture on the Dimension of Splines
Stefan Tohaneanu, University of Western Ontario, Canada

11:00-11:25 Splines on Polyhedral Complexes
Hal Schenck, University of Illinois, USA

11:30-11:55 Shellability and Freeness of Continuous Splines
Michael DiPasquale, University of Illinois, USA

12:00-12:25 Computational Topology and Visualization
Lance E. Miller, University of Utah, USA

Saturday, August 3

MS54

Post-Quantum Cryptography - Part II of II

10:00 AM-11:30 AM

Room:Andrew G. Clark Building – A202

For Part 1 see MS29

The most commonly used public-key cryptosystems on the internet today are RSA and ECC. Both of these schemes become trivially breakable once sufficiently large quantum computers are built. Post-Quantum Cryptography studies cryptosystems that remain secure against attacks by quantum computers. Particular areas of interest include public-key cryptosystems based on the difficulty of finding short vectors in lattices, finding low-weight words in error-correcting codes, and solving systems of quadratic equations in many variables.

Organizer: Tanja Lange
Technische Universiteit Eindhoven, The Netherlands

Organizer: Dan Bernstein
University of Illinois at Chicago and Technische Universiteit Eindhoven, the Netherlands

10:00-10:25 McBits: Fast Constant-time Code-based Cryptography
Tung Chou, TU Eindhoven, The Netherlands; Daniel Bernstein, University of Ilinois at Chicago, USA; Peter Schwabe, Radboud University Nijmegen, The Netherlands

10:30-10:55 Quantum Algorithms for the Subset-sum Problem
Daniel Bernstein, University of Ilinois at Chicago, USA

11:00-11:25 Solving the Shortest Vector Problem in Lattices Faster Using Quantum Search
Thijs Laarhoven, TU Eindhoven, The Netherlands; Michele Mosca, University of Waterloo, Canada; Joop van de Pol, University of Bristol, United Kingdom

Saturday, August 3

MS55

Computational Aspects of Moving Frames - Part I of III

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A203

For Part 2 see MS68

Moving frame methods are extensively used in differential geometry and applied mathematics. They find numerous applications in engineering and sciences, and this trend has been strengthened in the last decade with the emergence of pragmatic algebraic approaches to the computations involved. This minisymposium will be concerned with methods and algorithms available for computing differential invariants and finite difference invariants of transformation groups along with techniques used to analyze their associated algebraic structures. Applications and implementations of these ideas to geometric problems will also be considered.

Organizer: Francis Valiquette
Dalhousie University, Canada

Organizer: Evelyne Hubert
INRIA Méditerranée, France

10:00-10:25 Recursive Moving Frames
Francis Valiquette, Dalhousie University, Canada

10:30-10:55 The Geometry of Lightlike Surfaces in Minkowski Space
Jeanne Clelland, University of Colorado Boulder, USA; Brian Carlsen, University of Colorado, USA

11:00-11:25 Moving Frames and Flows for Curves in Centroaffine Space
Thomas Ivey and Annalisa M. Calini, College of Charleston, USA; Gloria Mari Beffa, University of Wisconsin, Madison, USA

11:30-11:55 Symbols, Tableaux, and Pseudogroups (with Sage)
Abraham D. Smith, Fordham University, USA

12:00-12:25 Cohomology of Variational Bicomplexes Invariant under a Pseudo-Group Action
Juha Pohjanpelto, Oregon State University, USA

Saturday, August 3

MS56

Algebro-geometric Approaches to Tensor Spaces, Tensor Decomposition, and Identifiability - Part III of III

10:00 AM-11:30 AM

Room:Andrew G. Clark Building – A204

For Part 2 see MS31

This session is concerned with algebraic and geometric approaches to problems related to: 1) spaces of tensors; 2) various notions of ranks for tensors; 3) tensor decomposition; 4) identifiability; and 5) representation theory and tensors.

Organizer: Hirotachi Abo
University of Idaho, USA

Organizer: Luke Oeding
University of California, Berkeley, USA

Organizer: Giorgio Ottaviani
University of Firenze, Italy

Organizer: Chris Peterson
Colorado State University, USA

10:00-10:25 Rank of Tensors via Secant Varieties and Fat Points
Maria Virginia Catalisano, University of Genoa, Italy

10:30-10:55 The Common Lines Variety
David M. Dynerman, University of Wisconsin, USA

11:00-11:25 The Waring Rank of the Vandermonde Determinant
Alexander Woo, University of Idaho, USA; Zach Teitler, Boise State University, USA

Saturday, August 3

MS57

Combining Convex and Algebraic Geometry in Singular

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A205

Algebraic and convex geometry have deep connections, for example, in the context of varieties with torus action, geometric invariant theory, and Mori theory. Recent implementations of methods for convex geometry in Singular provide the necessary techniques for investigating these connections by the means of computer algebra. In this minisymposium, we will focus on new results and implementations in the theory of Cox rings, polyhedral divisors, GIT fans and Mori dream spaces.

Organizer: Yue Ren
Technische Universität Kaiserslautern, Germany

Organizer: Janko Boehm
Technische Universität Kaiserslautern, Germany

Organizer: Wolfram Decker
Technische Universität Kaiserslautern, Germany

10:00-10:25 New Developments in Singular and Application to the Computation of the Git Fan
Yue Ren, Technische Universität Kaiserslautern, Germany

10:30-10:55 Computations with Mori Dream Spaces
Jürgen Hausen, Universität Tübingen, Germany

11:00-11:25 Computing Cox Rings
Simon Keicher, Universität Tübingen, Germany

11:30-11:55 Merging Divisorial with Colored Fans
Klaus Altmann, Free University of Berlin, Germany; Valentina Kiritchenko, HSE Moscow, Russia; Lars Petersen, DB Frankfurt, Germany

12:00-12:25 Using Polyhedral Divisors in Algebraic Geometry
Lars Kastner, Free University of Berlin, Germany

Saturday, August 3

MS58

Algebraic Geometry and Phylogenetics

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A207

Algebraic geometry has both practical and theoretical applications to phylogenetics, the study of reconstructing evolutionary histories of groups of organisms. In this mini-symposium we will explore several of these applications, as well as how problems in phylogenetics have motivated the exploration of particular classes of algebraic varieties. Recent work in invariant based reconstruction algorithms, phylogenetic tree distributions, Lie Markov models, and algebraic varieties associated to the general Markov model will be discussed.

Organizer: Joseph P. Rusinko
Winthrop University, USA

10:00-10:25 Invariant Based Phylogenetic Reconstruction: Opportunities and Obstacles
Joseph P. Rusinko, Winthrop University, USA

10:30-10:55 Nonparametric Estimation of Phylogenetic Tree Distributions
Grady Weyenberg, University of Kentucky, USA; Peter Huggins, Carnegie Mellon University, USA; Christopher Schardl, Daniel Howe, and *Ruriko Yoshida*, University of Kentucky, USA

11:00-11:25 Lie Markov Models with Prescribed Symmetry
Jesús Fernández-Sánchez, Universitat Politecnica de Catalunya, Spain; Peter D. Jarvis and Jeremy Sumner, University of Tasmania, Australia

11:30-11:55 Tensor Rank and Toric Structure
Mateusz Michalek, Max Planck Institute, Germany

Saturday, August 3

MS59

Sparse Models, Interpolation and Polynomials - Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – C146

For Part 1 see MS34

The ability to extract, model and manipulate the underlying structure or support of a "hidden" sparse object has seen exciting recent developments. New sparse interpolation algorithms are able to extract structural features through a remarkably small number of probes, even in the presence of noise and outlier errors. An important synergy for recovery is developing between algebraic algorithms for sparse polynomials, signal processing, and error correcting coding. Prony-like methods are competing with compressed sensing techniques to obtain numerically robust methods with low complexity. Applications include medical signal processing and symbolic-numeric solution of polynomial equations.

Organizer: Mark Giesbrecht
University of Waterloo, Canada

Organizer: Erich Kaltofen
North Carolina State University, USA

Organizer: Wen-shin Lee
University of Antwerp, Belgium

10:00-10:25 Sparse Interpolation and Signal Processing
Wen-shin Lee and Annie Cuyt, University of Antwerp, Belgium

10:30-10:55 Recovering a Sparse Polynomial Model from Data with Noise and Outliers
Brice B. Boyer, Erich L Kaltofen, and Matthew Comer, North Carolina State University, USA

continued in next column

11:00-11:25 Sparse Multivariate Function Recovery From Values with Noise and Outlier Errors
Erich Kaltofen, North Carolina State University, USA; *Zhengfeng Yang*, East China Normal University, China

11:30-11:55 Numerical Reconstruction of Polytopes from Directional Moments
Mathieu Collowald, INRIA Sophia Antipolis, France; Annie Cuyt, University of Antwerp, Belgium; Evelyne Hubert, INRIA Méditerranée, France; Wen-shin Lee, University of Antwerp, Belgium

12:00-12:25 Sparse Models, Interpolation and Polynomials -- A Summary
Erich Kaltofen, North Carolina State University, USA

Saturday, August 3

MS60

Number Theory and Curves - Part I of III

10:00 AM-12:30 PM

Room:Willard O. Eddy Hall - 106

For Part 2 see MS73

The minisymposia focus on important topics about the arithmetic of curves including statistics associated with function field extensions, computations for elliptic and hyperelliptic curves, and rational points on curves.

Organizer: Rachel Pries
Colorado State University, USA

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

10:00-10:25 Statistics for Points on Curves over Finite Fields
Alina Bucur, University of California, San Diego, USA; Chantal David, Concordia College, USA; Brooke Feigon, City College of CUNY, USA; Matilde Lalin, University of Montreal, Canada

10:30-10:55 Random Matrices and Cohen-Lenstra Distributions in Function Fields
Derek Garton, Northwestern University, USA

11:00-11:25 Counting Dihedral Function Fields
Colin J. Weir, University of Calgary, Canada

11:30-11:55 The Ekedahl-Oort type of Supersingular Curves
Rachel Pries, Colorado State University, USA

12:00-12:25 Degenerations and Non-algebraically Closed Fields
Brian Osserman, University of California, Davis, USA

MS61

See Sunday morning

Saturday, August 3

MS62

Algorithms in Real Algebraic Geometry and its Applications - Part III of III

10:00 AM-12:30 PM

Room:Willard O. Eddy Hall - 108

For Part 2 see MS49

Algorithms for solving of polynomial systems are of great importance both in theory and practice. Usually, the end-user seeks for information on the real solutions. Typical questions are deciding the existence of real solutions, isolating them whenever they exist, answer connectivity queries, perform quantifier elimination over the reals, etc. There are effective variants of the core topics studied in real algebraic geometry. However, the complexity of solving most of these problems is at least singly exponential in the number of variables. Hence, the development of the fastest possible algorithms within the best possible complexity class that lead to efficient implementations is of first importance.

Organizer: Elias Tsigaridas
INRIA Sophia Antipolis, France

Organizer: Mohab Safey El Din
Université Paris 6, France

10:00-10:25 Refined Bounds on Connected Components of Sign Conditions on a Variety II
Sal P. Barone and Saugata Basu, Purdue University, USA

10:30-10:55 Safety Verification of Cyber-Physical Systems Using the Theory of Reals
Ashish Tiwari, SRI International, USA

11:00-11:25 Some Applications of Cylindrical Algebraic Decomposition
Veronika Pillwein, Johannes Kepler University Linz, Austria

continued in next column

11:30-11:55 Applications of Real Numerical Algebraic Geometry
Jonathan Hauenstein, North Carolina State University, USA; Charles Wampler, General Motors Research Laboratories, USA

12:00-12:25 The Geometry of the TDOA–based Localization
Marco Compagnoni, Roberto Notari, Fabio Antonacci, and Augusto Sarti, Politecnico di Milano, Italy

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

SIAG/AG Business Meeting

1:00 PM-1:50 PM

Room:Andrew G. Clark Building – A101

Saturday, August 3

IP6

Cluster Algebra and Complex Volume of Knots

2:00 PM-3:00 PM

Room:Andrew G. Clark Building – A101

Chair: Jan Draisma, Technische Universiteit Eindhoven, The Netherlands

The cluster algebra was introduced by Fomin and Zelevinsky around 2000. The characteristic operation in the algebra called `mutation' is related to various notions in mathematics and mathematical physics. In this talk I review a basics of the cluster algebra, and introduce its application to study the complex volume, (hyperbolic volume) + i (Chern-Simons invariant), of knot complements in S^3. We formulate the ideal tetrahedral decomposition of hyperbolic 3-manifolds in terms of the cluster algebra, where a mutation produces an ideal tetrahedron. This talk is based on joint work with Kazuhiro Hikami (Kyushu University).

Rei Inoue
Chiba University, Japan

Coffee Break

3:00 PM-3:30 PM

Room:Andrew G. Clark Building – Clark A Wing

Saturday, August 3

MS63

Formulas in Interpolation - Part II of III

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A102

For Part 1 see MS50
For Part 3 see MS76

This minisymposium focuses on interpolation in Computational Algebra and Algebraic Geometry. Interpolation has proven to be a very effective tool for both computational and also theoretical purposes. From reconstructing defining polynomials of algebraic varieties to giving closed formulas for these polynomials, the goal of the meeting will be to understand the connections between the geometric and the algebraic counterpart of interpolation, and also to explore generalized interpolation methods (such as Birkhoff interpolation and its multivariate versions). Specific topics included: -- closed formulas in interpolation -- solvability (of Hermite-Birkhoff type) interpolation problems -- rational interpolation problems -- relations to the theory of subresultants and Schur functions -- Alexander-Hirschowitz type theorems

Organizer: Carlos D'Andrea
Universitat de Barcelona, Spain

Organizer: Teresa Krick
Universidad de Buenos Aires, Argentina

Organizer: Agnes Szanto
North Carolina State University, USA

3:30-3:55 Interpolation and Walks on the Hilbert Scheme
Bernard Mourrain, INRIA Sophia Antipolis, France

4:00-4:25 Subresultants, Sylvester Sums and the Rational Interpolation Problem
Carlos D'Andrea, Universitat de Barcelona, Spain; *Teresa Krick*, Universidad de Buenos Aires, Argentina; Agnes Szanto, North Carolina State University, USA

continued in next column

4:30-4:55 Fraction-Free Polynomial Arithmetic with Interpolation Bases
George Labahn, University of Waterloo, Canada

5:00-5:25 Divided Differences and Combinatorial Nullstellensatz
Géza Kós and Lajos Rónyai, Hungarian Academy of Sciences, Hungary; Tamás Mészáros, Central European University, Hungary

Saturday, August 3

MS64

Applications of Computational and Numerical Algebraic Geometry to Theoretical Physics - Part I of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A103

For Part 2 see MS78

Symbolic Algebraic Geometry (AG) methods have been used in theoretical physics for quite some time now. Recently, numerical AG have also been used to solve more complicated problems arising in Physics. Though a huge amount of activities in applying the AG methods have been happening in recent years, the related communities of physicists and mathematicians seem to have no formal interactions. The minisymposium will bring both the communities together in the hope of starting a stimulating interaction among the communities for the benefits of both.

Organizer: Yang-Hui He
University of Oxford, United Kingdom

Organizer: Dhagash Mehta
Syracuse University, USA

3:30-3:55 Numerical Algebraic Geometry and Potential Energy Landscapes
Dhagash Mehta, Syracuse University, USA

4:00-4:25 Integrand Reduction of High-loop Scattering Amplitudes via Computational Algebraic Geometry
Yang Zhang, Niels Bohr Institute, Denmark

4:30-4:55 Supersymmetric Hidden Sectors for Heterotic Standard Models
Burt Ovrut, University of Pennsylvania, USA

5:00-5:25 Algebraic Geometry and the Search for Calabi-Yau Manifolds with Large Volume Vacua
Brent Nelson, Northeastern University, USA

5:30-5:55 Calabi-Yau 3-folds. Collect them all!
Ross Altman, Northeastern University, USA

Saturday, August 3

MS65

Applications of Numerical Algebraic Geometry - Part II of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A104

For Part 1 see MS52

This minisymposium will feature experts in the various applications of numerical algebraic geometry both within and outside algebraic geometry. Approximately half of the speakers will focus on applications within algebraic geometry, such as fast parameter homotopies, exceptional mechanisms. The other half of the speakers will focus on the use of continuation methods in problems outside numerical algebraic geometry, in areas such as nonlinear PDEs, tumor growth models, and maximum likelihood estimation. The common thread between all talks will be the use of numerical algebraic geometry methods and software.

Organizer: Wenrui Hao
University of Notre Dame, USA

3:30-3:55 Applications of Homotopy Method to Nonlinear Pdes
Wenrui Hao, University of Notre Dame, USA

4:00-4:25 Chebyshev Method for a Free Boundary Problem Modeling Tumor Growth
Oliver Kernell, University of Notre Dame, USA

4:30-4:55 Numerical Algebraic Geometry in Algebraic Statistics
Jose Rodriguez, University of California, Berkeley, USA

5:00-5:25 Paramotopy: Parallel Parameter Homotopy Software Through Bertini
Daniel A. Brake, Colorado State University, USA

5:30-5:55 A Web Interface for PHCpack
Jan Verschelde and *Xiangcheng Yu*, University of Illinois, Chicago, USA

Saturday, August 3

MS66

Approximation Theory, Geometric Modeling, and Algebraic Geometry - Part II of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A201

For Part 1 see MS53
For Part 3 see MS79

Piecewise-defined polynomials play an important role in both Approximation Theory and in Geometric Modeling. This not only connects these fields, but enables the use of methods from Algebraic Geometry and Commutative Algebra to be applied to problems arising in Geometric Modeling and Approximation Theory. This minisymposium will feature work highlighting interactions between these fields.

Organizer: Luis Garcia
Sam Houston State University, USA

Organizer: Frank Sottile
Texas A&M University, USA

3:30-3:55 Representation of Surface Pencil with A Common Line of Curvature
Chungang Zhu, Caiyun Li, and Renhong Wang, Dalian University of Technology, China

4:00-4:25 Towards an Algebra for Rational Curves and Surfaces in Two and Three Dimensions
Ron Goldman, Rice University, USA

4:30-4:55 Toric Degenerations of (irrational) Bezier Patches
Luis D. Garcia-Puente, Sam Houston State University, USA; Frank Sottile, Texas A&M University, USA; Chungang Zhu, Dalian University of Technology, China; Elisa Postinghel, Polish Academy of Sciences, Poland; Nelly Villamizar, Johann Radon Institute for Computational and Applied Mathematics, Austria

continued on next page

Saturday, August 3

MS66

Approximation Theory, Geometric Modeling, and Algebraic Geometry - Part II of III

continued

5:00-5:25 Wachspress Varieties
Frank Sottile, Texas A&M University, USA; Corey Irving, Santa Clara University, USA; Henry Schenck, University of Illinois, USA; Gregory G. Smith, Queen's University, Canada

5:30-5:55 Kolmogorov's Problem on the Class of Multiply Monotone Functions
Yuliya Babenko, Kennesaw State University, USA; Vladislav Babenko and Oleg Kovalenko, Dnipropetrovsk State University, Ukraine

Saturday, August 3

MS67

Coding Theory and Geometry - Part II of III

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – A202

For Part 1 see MS42
For Part 3 see MS80

Topics include codes constructed with algebraic curves, linear codes over fields and over rings, and subspace codes, with applications to polar coding, network coding and index coding.

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

Organizer: Elisa Gorla
University of Neuchatel, Switzerland

Organizer: Joachim Rosenthal
Universität Zürich, Switzerland

3:30-3:55 On the Number of Constacyclic Codes on a Class of Local Finite Frobenius Rings
Horacio Tapia-Recillas, UAM, Mexico

4:00-4:25 *GF(q)*-Linear Codes over $GF(q^t)$
Cary Huffman, Loyola University of Chicago, USA

4:30-4:55 Geometric Perspective on Alternant Codes
Kyle Marshall, University of Zurich, Switzerland

5:00-5:25 Graph Based Codes for Flash Memories
Christine A. Kelley and *Kathryn Haymaker*, University of Nebraska, Lincoln, USA

Saturday, August 3

MS68

Computational Aspects of Moving Frames - Part II of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A203

For Part 1 see MS55
For Part 3 see MS81

Moving frame methods are extensively used in differential geometry and applied mathematics. They find numerous applications in engineering and sciences, and this trend has been strengthened in the last decade with the emergence of pragmatic algebraic approaches to the computations involved. This minisymposium will be concerned with methods and algorithms available for computing differential invariants and finite difference invariants of transformation groups along with techniques used to analyze their associated algebraic structures. Applications and implementations of these ideas to geometric problems will also be considered.

Organizer: Francis Valiquette
Dalhousie University, Canada

Organizer: Evelyne Hubert
INRIA Méditerranée, France

3:30-3:55 Induced Curvature Flow and Integrability
Evelyne Hubert, INRIA Méditerranée, France; Peter van der Kamp, University of La Trobe, Australia

4:00-4:25 Pseudo-spherical Twisted Columns
Emilio Musso, Politecnico di Torino, Italy

4:30-4:55 Calculations in the Lie Invariant Calculus of Variations - the General Case
Elizabeth Mansfield, University of Kent, United Kingdom; *Tania Goncalves*, Universidade Federal de Sao Carlos, Brazil

5:00-5:25 Holomorphic Differentials and Laguerre deformation of surfaces
Lorenzo Nicolodi, Universita degli Studi di Parma, Italy

5:30-5:55 Symbolic Computation of Lax Pairs of Systems of Partial Difference Equations Using Consistency Around the Cube
Willy A. Hereman and Terry Bridgman, Colorado School of Mines, USA

Saturday, August 3

MS69

Algebraic Geometry of Tensor Decompositions - Part III of III

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A204

For Part 2 see MS44

We are interested in various aspects of tensor decompositions studied under the light of algebraic geometry --- complex, real, convex, and tropical.

Organizer: Lek-Heng Lim
University of Chicago, USA

3:30-3:55 Algorithms for Tensor Decomposition via Numerical Homotopy and Optimization
Chris Peterson, Colorado State University, USA

4:00-4:25 Eigenvectors of Tensors and Waring Decomposition
Luke Oeding, University of California, Berkeley, USA; Giorgio Ottaviani, University of Firenze, Italy

4:30-4:55 Computational Complexity and Linear Preservers
Ke Ye and Lek-Heng Lim, University of Chicago, USA

5:00-5:25 Tensor Network Decompositions
Jason Morton, Pennsylvania State University, USA

5:30-5:55 Real Rank of Real Symmetric Tensors
Greg Blekherman, Georgia Institute of Technology, USA

Saturday, August 3

MS70

Effective Methods in D-modules and Singularities - Part I of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A205

For Part 2 see MS83

D-modules, the modules over the ring of K-linear differential operators on the coordinate ring of a variety over a field K, have become an important tool to study singularities. Branches of this development include hypergeometric systems, Bernstein--Sato ideals, local cohomology theory and connections with the action of Frobenius. This minisymposium will bring together experts in the quantitative treatment of these methods who will discuss new techniques and results in this emerging field.

Organizer: Claudiu Raicu
Princeton University, USA

Organizer: Karl Schwede
Pennsylvania State University, USA

Organizer: Uli Walther
Purdue University, USA

3:30-3:55 F-jumping Numbers of Homogeneous Polynomials
Daniel Hernandez, University of Minnesota, USA; Luis C. Núñez-Betancourt, University of Michigan, USA; Emily E. Witt, University of Minnesota, USA; Wenliang Zhang, University of Nebraska, USA

4:00-4:25 A Stopping Condition to Compute Test Ideals and F-Jumping Numbers
Luis C. Núñez-Betancourt, University of Michigan, USA; Daniel Hernandez and Emily E. Witt, University of Minnesota, USA

4:30-4:55 Bernstein-Sato Ideals
Nero Budur, University of Notre Dame, USA

5:00-5:25 An Algorithm to Find Annihilators of Artinian Modules Compatible with a Frobenius Map
Wenliang Zhang, University of Nebraska, USA; Mordechai Katzman, University of Sheffield, United Kingdom

5:30-5:55 Modularity and the Reciprocal Plane
Graham Denham, University of Western Ontario, Canada

Saturday, August 3

MS71

Hyperbolic Polynomials - Part I of II

3:30 PM-6:00 PM

Room:Andrew G. Clark Building – A207

For Part 2 see MS84

Hyperbolic polynomials are real polynomials in several variables characterized by a simple reality condition on the zeros. Interest in hyperbolic polynomials originates in PDE theory, but they have been studied in several different areas of mathematics: 1) in real algebraic geometry, in particular with respect to their determinantal representations; 2) in convex optimization, where hyperbolic programming is a natural generalization of semidefinite programming; 3) in matroid theory, in connection with the half-plane property. Progress in each of these areas has been rapid in recent years and there has been a very fruitful exchance of ideas, which we hope to further in this minisymposium.

Organizer: Tim Netzer
University of Leipzig, Germany

Organizer: Daniel Plaumann
University of Konstanz, Germany

Organizer: Victor Vinnikov
Ben Gurion University Negev, Israel

3:30-3:55 Determinantal Representations of Singular Hypersurfaces in P^n
Dmitry Kerner, Ben Gurion University Negev, Israel

4:00-4:25 Boolean Matrices with Prescribed Row and Column Sums, Associated Partition Functions and Hyperbolic Polynomials
Leonid Gurvits, Los Alamos National Laboratory, USA

4:30-4:55 Primal-Dual Algorithms for Optimization over Hyperbolicity Cones
James M. Renegar, Cornell University, USA

continued on next page

Saturday, August 3

MS71

Hyperbolic Polynomials - Part I of II

continued

5:00-5:25 Hyperbolic Cone Programming: Structure and Interior-Point Algorithms
Levent Tuncel, University of Waterloo, Canada

5:30-5:55 Norm-constrained Determinantal Representations of Multivariable Polynomials
Dmitry Kaliuzhnyi-Verbovetskyi, Drexel University, USA

Saturday, August 3

MS72

Exact Linear Algebra - Part I of II

3:30 PM-5:30 PM

Room:Andrew G. Clark Building – C146

For Part 2 see MS85
Exact linear algebra is a core component in most intensive algebraic computations. Reducing computations to fast linear algebra is often a way to improve asymptotic time complexities but also to speed-up computations in practice. These two sessions will address some of the recent advances in algorithms (relaxed lifting techniques and fast polynomial matrix arithmetic) and implementations (parallelizations). The focus will will also be put on some successful applications in cryptology (elimination over F2 ; LWE), coding theory (polynomial lattice reductions) and homology computations (local Smith forms).

Organizer: Clément Pernet
Université de Grenoble I, France

Organizer: Martin Albrecht
Technical University of Denmark, Denmark

Organizer: Pascal Giorgi
Universite de Montpellier II, France

3:30-3:55 Linear Algebra with Errors: On the Complexity of the Learning with Errors Problem
Martin Albrecht, Technical University of Denmark, Denmark

4:00-4:25 Fast Matrix Decomposition in F2
Enrico Bertolazzi, Universita di Trento, Italy; Anna Rimoldi, Università di Trento, Italy

4:30-4:55 Relaxed Hensel Lifting for Dense, Sparse and Structured Linear System Solving
Romain Lebreton, Universite de Montpellier II, France

5:00-5:25 Rational Linear Solvers and Local Smith Forms and How They Apply to Homology Computation
David Saunders, University of Delaware, USA

Saturday, August 3

MS73

Number Theory and Curves - Part II of III

3:30 PM-6:00 PM

Room:Willard O. Eddy Hall - 106

For Part 1 see MS60
For Part 3 see MS86
The minisymposia focus on important topics about the arithmetic of curves including statistics associated with function field extensions, computations for elliptic and hyperelliptic curves, and rational points on curves.

Organizer: Rachel Pries
Colorado State University, USA

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

3:30-3:55 A Lutz-Nagell Theorem for Hyperelliptic Curves
David Grant, University of Colorado Boulder, USA

4:00-4:25 Improved Scalar Multiplication on Hyperelliptic Curves
Michael Jacobson, University of Calgary, Canada

4:30-4:55 *p*-Adic Height Pairings and Integral Points on Hyperelliptic Curves
Jennifer Balakrishnan, Harvard University, USA; Amnon Besser, University of Oxford, United Kingdom; J. Steffen Mueller, Universitat Hamburg, Germany

5:00-5:25 Real Hyperelliptic Curves of Genus 2
Stefan Erickson, Colorado College, USA

5:30-5:55 Effective Chabauty for symmetric Powers of Curves
Jennifer Park, Massachusetts Institute of Technology, USA

Saturday, August 3

MS74

Applied and Computational Topology - Part III of III

3:30 PM-6:00 PM

Room:Willard O. Eddy Hall - 107

For Part 2 see MS48

Applied and computational topology is a vibrant research area that's gained momentum over the last decade. A core aim is data analysis by way of understanding the shape of the data. To devise robust techniques, researchers are interested in questions of stability of topological descriptors. To process modern datasets, the field is interested in efficient algorithms. The goal of the minisymposium is to create a forum for young researchers to present recent developments in the field.

Organizer: Dmitriy Morozov
Lawrence Berkeley National Laboratory, USA

Organizer: Mikael Vejdemo Johansson
University of St. Andrews, United Kingdom

3:30-3:55 Homological Algebra over Semirings for Optimization
Sanjeevi Krishnan, University of Pennsylvania, USA

4:00-4:25 Multicore Homology
Ryan Lewis, Stanford University, USA

4:30-4:55 Inferring Dynamics with Perisistence
Primoz Skraba, Jozef Stefan Institute, Slovenia

5:00-5:25 Evasion Paths in Mobile Sensor Networks
Henry Adams and Gunnar E. Carlsson, Stanford University, USA

5:30-5:55 Spaces of Shapes: Creating Moduli Spaces of Chemical Compounds for Drug Discovery
Anthony Bak, Stanford University, USA

Saturday, August 3

MS75

Applications to the Life and Physical Sciences - Part I of II

3:30 PM-6:00 PM

Room:Willard O. Eddy Hall - 108

For Part 2 see MS87

Algebraic geometry has proved to be a rich resource for the life and physical sciences. For example, tools within the field have been used to identify genetic mutations, predict the secondary and tertiary structure of molecules, model regulatory and signaling pathways, and analyze models of evolutionary history. We aim to showcase its impact in the sciences and how it is being transformed by such interactions.

Organizer: Brandilyn Stigler
Southern Methodist University, USA

Organizer: Matthew Macauley
Clemson University, USA

3:30-3:55 Algebraic Geometry in the Life and Physical Sciences: Past, Present, and Future
Brandilyn Stigler, Southern Methodist University, USA; Matthew Macauley, Clemson University, USA

4:00-4:25 Detection of De Novo Copy Number Variants from Whole Exome Sequencing Data
Mingfu Zhu and Yongzhuang Liu, Duke University, USA

4:30-4:55 Reverse Engineering Functional Networks of the Human Brain within the Polynomial Dynamical Systems Framework
Paola Vera-Licona, Institut Curie, France

5:00-5:25 Algebraic Geometry of Partially Nested Canalyzing Functions
Qijun He, Clemson University, USA

5:30-5:55 Hodge-Kodaira Decomposition of Evolving Neural Networks
Keiji Miura, Tohoku University, Japan; Takaaki Aoki, Kagawa University, Japan

Saturday, August 3

Intermission

6:00 PM-6:10 PM

Forward Looking Session

6:10 PM-7:10 PM

Room:Andrew G. Clark Building – A101

Chair: Alicia Dickenstein, Universidad de Buenos Aires, Argentina

Chair: Anton Leykin, Georgia Institute of Technology, USA

Panelists:

Yuliy Baryshnikov
University of Illinois at Urbana-Champaign, USA

Greg Blekherman
Georgia Institute of Technology, USA

Sandra Di Rocco
KTH Stockholm, Sweden

Olga Holtz
University of California, Berkeley, USA and Technische Universitat Berlin, Germany

Rei Inoue
Suzuka University of Medical Science, Japan

Damien Stehlé
École Normale Supérieure de Lyon, France

Ravi Vakil
Stanford University, USA

Carsten Wiuf
University of Copenhagen, Denmark

Sunday, August 4

Registration

7:30 AM-2:00 PM

Room:Andrew G. Clark Building – Clark A Wing

Announcements

8:20 AM-8:30 AM

Room:Andrew G. Clark Building – A101

Sunday, August 4

IP7

Speeding up Lattice Reduction with Numerical Linear Algebra Techniques

8:30 AM-9:30 AM

Room:Andrew G. Clark Building – A101

Chair: Joachim Rosenthal, Universität Zürich, Switzerland

A lattice is the set of all integer linear combinations of some linearly independent vectors. Visually, it is an infinite grid of regularly spaced points. Lattices have many applications in computer science. For example, they frequently appear in computer algebra (e.g., to factor rational polynomials), and in cryptography (both to break and design cryptographic protocols). The LLL algorithm, named after its authors Arjen Lenstra, Hendriz Lenstra and László Lovász, enables the computation of a good representation, or basis, of a given lattice: This representation provides decent intrinsic information on the lattice under scope. Numerous applications were found right after the discovery of the LLL algorithm, which motivated the search of algorithmic improvements. Today, the most efficient approach relies, internally, on low precision floating-point computations, leading to a numeric-algebraic hybrid algorithm. In this talk, I will first give an introduction to lattices, and then describe the hybrid numeric-algebraic approach underlying the modern variants of the LLL algorithm. This talk relies on joint works with Xiao-Wen Chang, Phong Nguyen, Andrew Novocin, Ivan Morel and Gilles Villard

Damien Stehlé
École Normale Supérieure de Lyon, France

Coffee Break

9:30 AM-10:00 AM

Room:Andrew G. Clark Building – Clark A Wing

Sunday, August 4

MS61

Symbolic Combinatorics - Part III of III

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 107

For Part 2 see MS36

In recent years algorithms and software have been developed that allow researchers to discover and verify combinatorial identities as well as understand analytic and algebraic properties of generating functions. The interaction of combinatorics and symbolic computation has had a beneficial impact on both fields. This minisymposium will feature 12 speakers describing recent research combining these areas.

Organizer: Manuel Kauers
RISC, Austria

Organizer: Michael Singer
North Carolina State University, USA

10:00-10:25 Symbolic Summation for Combinatorial and Physical Problems
Carsten Schneider, Johannes Kepler University Linz, Austria

10:30-10:55 Open Combinatorial Problems Arising from New Sequences in the OEIS
Neil Sloane, OEIS Foundation, USA

11:00-11:25 Valuations of Sequences: Examples in Search of a Theory
VIctor Moll, Tulane University, USA

11:30-11:55 Order-Degree Bounds for Recurrence and Differential Operators
Shaoshi Chen, North Carolina State University, USA; *Maximilian Jaroschek* and Manuel Kauers, Johannes Kepler University Linz, Austria; Michael Singer, North Carolina State University, USA

Sunday, August 4

MS76

Formulas in Interpolation - Part III of III

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A102

For Part 2 see MS63

This minisymposium focuses on interpolation in Computational Algebra and Algebraic Geometry. Interpolation has proven to be a very effective tool for both computational and also theoretical purposes. From reconstructing defining polynomials of algebraic varieties to giving closed formulas for these polynomials, the goal of the meeting will be to understand the connections between the geometric and the algebraic counterpart of interpolation, and also to explore generalized interpolation methods (such as Birkhoff interpolation and its multivariate versions). Specific topics included: -- closed formulas in interpolation -- solvability (of Hermite-Birkhoff type) interpolation problems -- rational interpolation problems -- relations to the theory of subresultants and Schur functions -- Alexander-Hirschowitz type theorems

Organizer: Carlos D'Andrea
Universitat de Barcelona, Spain

Organizer: Teresa Krick
Universidad de Buenos Aires, Argentina

Organizer: Agnes Szanto
North Carolina State University, USA

10:00-10:25 Subresultants in Multiple Roots and Connections to Hermite-Birkhoff Interpolation

Carlos D'Andrea, Universitat de Barcelona, Spain; Teresa Krick, Universidad de Buenos Aires, Argentina; *Agnes Szanto*, North Carolina State University, USA

10:30-10:55 Polynomial Interpolation and Sums of Powers

Giorgio Ottaviani, University of Firenze, Italy; Chiara Brambilla, Politecnico delle Marche, Ancona, Italy

continued in next column

11:00-11:25 Reducing Implicitization to Interpolation via Support Prediction

Christos Konaxis, University of Crete, Greece; Ioannis Z. Emiris, National and Kapodistrian University of Athens, Greece; Tatjana Kalinka, University of Athens, Greece; Thang Luu Ba, Hanoi National University of Education, Vietnam

11:30-11:55 Remarks on Nagata's Conjecture

Rick Miranda, Colorado State University, USA

Sunday, August 4

MS77

Tensor Networks

10:00 AM-11:30 AM

Room:Andrew G. Clark Building – A103

The speakers will explore the use of tensor networks in physics and connections to invariant theory and the algebraic statistics of graphical models.

Organizer: Jason Morton
Pennsylvania State University, USA

10:00-10:25 Tensor Networks

Jason Morton, Pennsylvania State University, USA

10:30-10:55 Invariant Theory for Matrix Product States

Jacob Biamonte, ISI Torino, Italy

11:00-11:25 Contracting Tensor Networks

Jacob Turner, Pennsylvania State University, USA

Sunday, August 4

MS78

Applications of Computational and Numerical Algebraic Geometry to Theoretical Physics - Part II of II

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A104

For Part 1 see MS64

Symbolic Algebraic Geometry (AG) methods have been used in theoretical physics for quite some time now. Recently, numerical AG have also been used to solve more complicated problems arising in Physics. Though a huge amount of activities in applying the AG methods have been happening in recent years, the related communities of physicists and mathematicians seem to have no formal interactions. The minisymposium will bring both the communities together in the hope of starting a stimulating interaction among the communities for the benefits of both.

Organizer: Yang-Hui He
University of Oxford, United Kingdom

Organizer: Dhagash Mehta
Syracuse University, USA

10:00-10:25 Vector Bundles, Calabi-Yau Threefolds and the Heterotic String
Yang-Hui He, University of Oxford, United Kingdom

10:30-10:55 Title Not Available at Time of Publication
Amihay Hanany, Imperial College London, United Kingdom

11:00-11:25 New Moduli Spaces of Brane Tilings on Riemann Surfaces
Rak-Kyeong Seong, Imperial College London, United Kingdom

11:30-11:55 Generalized T-duality, String Theory and the Real World'
Djordje Minic, Virginia Tech, USA

Sunday, August 4

MS79

Approximation Theory, Geometric Modeling, and Algebraic Geometry - Part III of III

10:00 AM-12:00 PM

Room:Andrew G. Clark Building – A201

For Part 2 see MS66

Piecewise-defined polynomials play an important role in both Approximation Theory and in Geometric Modeling. This not only connects these fields, but enables the use of methods from Algebraic Geometry and Commutative Algebra to be applied to problems arising in Geometric Modeling and Approximation Theory. This minisymposium will feature work highlighting interactions between these fields.

Organizer: Luis D. Garcia-Puente
Sam Houston State University, USA

Organizer: Frank Sottile
Texas A&M University, USA

10:00-10:25 Some Algebraic Problems in Polynomial Interpolation
Boris Shekhtman, University of South Florida, USA

10:30-10:55 Special Positions of Body-and-cad Frameworks
Jessica Sidman and Ruimin Cai, Mount Holyoke College, USA; James Farre, University of Texas, Austin, USA; Audrey Lee-St.John, Mount Holyoke College, USA; Louis Theran, Freie Universitat Berlin, Germany

11:00-11:25 Linear Obstructions for Linear Systems in P^n
Elisa Postinghel, Polish Academy of Sciences, Poland; Chiara Brambilla, Politecnico delle Marche, Ancona, Italy; Olivia Dumitrescu, University of California, Davis, USA

11:30-11:55 Classification of Planar Pythagorean Hodograph Quintics
Zbynek Sir, Charles University, Prague, Czech Republic

Sunday, August 4

MS80

Coding Theory and Geometry - Part III of III

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A202

For Part 2 see MS67

Topics include codes constructed with algebraic curves, linear codes over fields and over rings, and subspace codes, with applications to polar coding, network coding and index coding.

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

Organizer: Elisa Gorla
University of Neuchatel, Switzerland

Organizer: Joachim Rosenthal
Universität Zürich, Switzerland

10:00-10:25 Partitions of Frobenius Rings Induced by the Homogeneous Weight
Heide Gluesing-Luerssen, University of Kentucky, USA

10:30-10:55 Colorability of Hypergraphs Using Commutative Algebra
Lubos Thoma and Michael Krul, University of Rhode Island, USA

11:00-11:25 Partial Spreads in Network Coding
Alberto Ravagnani and Elisa Gorla, University of Neuchatel, Switzerland

11:30-11:55 Efficient Representation for the Trace Zero Subgroup via Rational Functions
Elisa Gorla, University of Neuchatel, Switzerland; Maike Massierer, University of Basel and University of Neuchatel, Switzerland

12:00-12:25 An MQ/Code Cryptosystem Proposal
Leonard Schulman, California Institute of Technology, USA; Jonathan Hall, Michigan State University, USA

Sunday, August 4

MS81

Computational Aspects of Moving Frames - Part III of III CANCELLED

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A203

For Part 2 see MS68

Moving frame methods are extensively used in differential geometry and applied mathematics. They find numerous applications in engineering and sciences, and this trend has been strengthened in the last decade with the emergence of pragmatic algebraic approaches to the computations involved. This minisymposium will be concerned with methods and algorithms available for computing differential invariants and finite difference invariants of transformation groups along with techniques used to analyze their associated algebraic structures. Applications and implementations of these ideas to geometric problems will also be considered.

CANCELLED

Organizer: Francis Valiquette
Dalhousie University, Canada

Organizer: Evelyne Hubert
INRIA Méditerranée, France

Sunday, August 4

MS82

Algebraic Geometry, Moment Problems and Applications

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A204

Moments matrices appear in different algebraic problems: tensor decomposition, exponential polynomials, optimization, curbature formulas, ... The aim of this mini-symposium is to present different contexts in applied algebraic geometry where these mathematical objects are involved and how they are used to solve algebraic or geometric problems.

Organizer: Bernard Mourrain
INRIA Sophia Antipolis, France

10:00-10:25 Moment Matrices and Applications
Annie Cuyt and Wen-shin Lee, University of Antwerp, Belgium

10:30-10:55 Shape from Moments
Dmitrii Pasechnik, NTU Singapore, Singapore

11:00-11:25 A Semidefinite Approach to the K_j Cover Problem
Joao Gouveia, Universidade de Coimbra, Portugal; James Pfeiffer, University of Washington, USA

11:30-11:55 Truncated Moment Problems, Extensions, and Positivity
Lawrence A. Fialkow, State University of New York, New Paltz, USA

12:00-12:25 Quadratic Forms, Flat Extensions and Applications
Bernard Mourrain, INRIA Sophia Antipolis, France

Sunday, August 4

MS83

Effective Methods in D-modules and Singularities- Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A205

For Part 1 see MS70

D-modules, the modules over the ring of K-linear differential operators on the coordinate ring of a variety over a field K, have become an important tool to study singularities. Branches of this development include hypergeometric systems, Bernstein--Sato ideals, local cohomology theory and connections with the action of Frobenius. This minisymposium will bring together experts in the quantitative treatment of these methods who will discuss new techniques and results in this emerging field.

Organizer: Claudiu Raicu
Princeton University, USA

Organizer: Karl Schwede
Pennsylvania State University, USA

Organizer: Uli Walther
Purdue University, USA

10:00-10:25 A Charaterization of F-jumping Numbers
Felipe Perez, University of Michigan, USA

10:30-10:55 Differential Operators and Invariant Theory
Will Traves, United States Naval Academy, USA

11:00-11:25 Explicit formulas for F-pure Thresholds and Roots of Bernstein-Sato Polynomials
Emily E. Witt, University of Minnesota, USA; Daniel Hernández, Mathematical Sciences Research Institute, Berkeley, USA

11:30-11:55 Torus Invariants and Binomial D-Modules
Christine Berkesch, Duke University, USA; Laura Felicia Matusevich, Texas A&M University, USA; Uli Walther, Purdue University, USA

12:00-12:25 Transformations of Hypergeometric Functions
Laura Matusevich, Texas A&M University, USA; Jens Forsgaard, Stockholm University, Sweden

Sunday, August 4

MS84

Hyperbolic Polynomials - Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – A207

For Part 1 see MS71

Hyperbolic polynomials are real polynomials in several variables characterized by a simple reality condition on the zeros. Interest in hyperbolic polynomials originates in PDE theory, but they have been studied in several different areas of mathematics: 1) in real algebraic geometry, in particular with respect to their determinantal representations; 2) in convex optimization, where hyperbolic programming is a natural generalization of semidefinite programming; 3) in matroid theory, in connection with the half-plane property. Progress in each of these areas has been rapid in recent years and there has been a very fruitful exchance of ideas, which we hope to further in this minisymposium.

Organizer: Tim Netzer
University of Leipzig, Germany

Organizer: Daniel Plaumann
University of Konstanz, Germany

Organizer: Victor Vinnikov
Ben Gurion University Negev, Israel

10:00-10:25 Hyperbolicity Cones and Projections of Spectrahedra
Raman Sanyal, Freie Universitaet Berlin, Germany

10:30-10:55 Hyperbolic Polynomials, Interlacers, and Sums of Squares
Cynthia Vinzant, University of Michigan, USA

11:00-11:25 Stable Polynomials and Sums of Squares in Matroid Theory
David Wagner, University of Waterloo, Canada

11:30-11:55 Combinatorics of Hyperbolic Polynomials
Petter Branden, KTH Royal Institute of Technology, Sweden

12:00-12:25 Determinantal Representations of Projective Hyperbolic Curves
Eli Shamovich, Ben Gurion University Negev, Israel

Sunday, August 4

MS85

Exact Linear Algebra - Part II of II

10:00 AM-12:30 PM

Room:Andrew G. Clark Building – C146

For Part 1 see MS72

Exact linear algebra is a core component in most intensive algebraic computations. Reducing computations to fast linear algebra is often a way to improve asymptotic time complexities but also to speed-up computations in practice. These two sessions will address some of the recent advances in algorithms (relaxed lifting techniques and fast polynomial matrix arithmetic) and implementations (parallelizations). The focus will will also be put on some successful applications in cryptology (elimination over F2 ; LWE), coding theory (polynomial lattice reductions) and homology computations (local Smith forms).

Organizer: Clément Pernet
Université de Grenoble I, France

Organizer: Martin Albrecht
Technical University of Denmark, Denmark

10:00-10:25 Accelerating Block Wiedemann Implementation in LinBox
Pascal Giorgi, Universite de Montpellier II, France

10:30-10:55 Simultaneous Computation of Row and Column Rank Profiles
Clément Pernet, Université de Grenoble I, France

11:00-11:25 Parallel Exact Gaussian Elimination of Rank Deficient Matrices
Ziad Sultan, Grenoble University, France

11:30-11:55 Lattice Reduction of Polynomial Matrices
Arne Storjohann, University of Waterloo, Canada

12:00-12:25 On the Complexity of Multivariate Interpolation with Multiplicities and of Simultaneous Polynomial Approximations
Vincent Neiger, ENS Lyon, France; Muhammad F.I. Chowdhury, Western University, Canada; Claude-Pierre Jeannerod, INRIA Rhone, France; Eric Schost, University of Western Ontario, Canada; Gilles Villard, Ecole Normale Superieure de Lyon, France

Sunday, August 4

MS86

Number Theory and Curves - Part III of III

10:00 AM-12:00 PM

Room:Willard O. Eddy Hall - 106

For Part 2 see MS73

The minisymposia focus on important topics about the arithmetic of curves including statistics associated with function field extensions, computations for elliptic and hyperelliptic curves, and rational points on curves.

Organizer: Rachel Pries
Colorado State University, USA

Organizer: Iwan Duursma
University of Illinois at Urbana-Champaign, USA

10:00-10:25 An Algorithm for Computing Degrees of Parametrizations of Elliptic Curves by Shimura Curves
Alyson Deines, University of Washington, USA

10:30-10:55 2-Adic Images of Galois Representations Associated to Elliptic Curves over Q
David Zureick-Brown, Emory University, USA; Jeremy Rouse, Wake Forest University, USA

11:00-11:25 Enumerating Abelian Varieties using Matrix Groups
Cassie L. Williams, James Madison University, USA

11:30-11:55 Genus 2 Curves with Good Reduction Away from p=3
Beth Malmskog, Colorado College, USA; Chris Rasmussen, Wesleyan University, USA

Sunday, August 4

MS87

Applications to the Life and Physical Sciences - Part II of II

10:00 AM-12:30 PM

Room:Willard O. Eddy Hall - 108

For Part 1 see MS75

Algebraic geometry has proved to be a rich resource for the life and physical sciences. For example, tools within the field have been used to identify genetic mutations, predict the secondary and tertiary structure of molecules, model regulatory and signaling pathways, and analyze models of evolutionary history. We aim to showcase its impact in the sciences and how it is being transformed by such interactions.

Organizer: Brandilyn Stigler
Southern Methodist University, USA

Organizer: Matthew Macauley
Clemson University, USA

10:00-10:25 Data Characterization and Identification for Network Inference
Elena S. Dimitrova, Clemson University, USA; Brandilyn Stigler, Southern Methodist University, USA

10:30-10:55 Geometric Approach to Learning Bayesian Networks with Applications to Biology
David Haws, IBM T.J. Watson Research Center, USA

11:00-11:25 The Neural Ring: An Algebraic Tool for Analyzing Neural Codes
Carina Curto, Vladimir Itskov, Alan Veliz-Cuba, and Nora Youngs, University of Nebraska, Lincoln, USA

11:30-11:55 Encoding Simplicial Complexes by Neural Networks
Vladimir Itskov, Carina Curto, and Chad Giusti, University of Nebraska, Lincoln, USA

12:00-12:25 Exact Hypothesis Tests for Biological Network Data
Ian Dinwoodie and Kruti Pandya, Portland State University, USA

Lunch Break

12:30 PM-1:30 PM

Attendees on their own

Sunday, August 4

IP8

Multivariate Polynomial Interpolation provides Surprising Combinatorial Insights: Zonotopal Algebra and Beyond

1:30 PM-2:30 PM

Room:Andrew G. Clark Building – A101

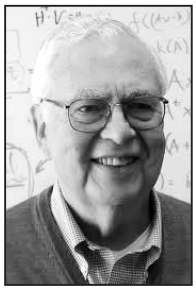
Chair: Anton Leykin, Georgia Institute of Technology, USA

I will survey recent developments connecting multivariate polynomial interpolation, special polynomial ideals, geometry and combinatorics of hyperplane arrangements, vector partition functions and matroid theory. These connections originated in the theory of multivariate splines and led to the construction of so-called zonotopal algebra(s), which in turn shed light on enumerative problems related to graphs and matroids. However, many interesting open questions remain.

Olga Holtz
University of California, Berkeley, USA and Technische Universitat Berlin, Germany

Simulation, Optimization, and Identification in Solid Mechanics

August 4—August 15, 2014
Linz, Austria



The fifth Gene Golub SIAM Summer School, with a focus on solid mechanics, will take place at the Johann Radon Institute for Computational and Applied Mathematics (RICAM), located at the Johannes Kepler University in Linz, Austria.

This summer school will foster advanced knowledge for the participating graduate students in several areas related to simulated materials in solid mechanics. Within this broad field the summer school will concentrate on four key issues, namely

- identification of material parameters from measurements
- material- and topology-optimization
- optimization subject to variational inequalities
- adaptive discretization

The first two topics will provide a platform for in-depth discussions on the relation of the areas of identification and optimization. The third topic will augment the first two by providing insight into the behavior of those problems for which variational inequalities are required for the modeling of the materials. Finally, the summer school will look at adaptive discretization of optimization problems for the purpose of reducing the computational costs involved in the solution of the problems encountered in the first three key topics.

The primary lecturers for these courses will be:

- Roland Herzog, TU Chemnitz, Germany
- Esther Klann, JKU Linz, Austria
- Michael Stingl, FAU Erlangen-Nürnberg, Germany
- Winnifried Wollner, University of Hamburg, Germany

Applicants selected to participate pay no registration. Funding for local accommodations and meal expenses will be available for all participants. Limited travel funds are also available.

Application deadline: February 1, 2014

For more details on the courses and on how to apply, go to:

http://www.math.uni-hamburg.de/g2s3

Sponsored by SIAM through an endowment from the estate of Gene Golub.
For more information about prior summer schools go to www.siam.org/students/g2s3/

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AG13 Abstracts

SIAM Conference on
Applied Algebraic Geometry

August 1-4, 2013
Colorado State University
Fort Collins, Colorado, USA

Abstracts are printed as submitted by the authors.

Notes

Organizer and Speaker Index

SIAM Conference on
Applied Algebraic Geometry

August 1-4, 2013
Colorado State University
Fort Collins, Colorado, USA

Italicized names indicate session organizers.

E

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Italicized names indicate session organizers.

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Italicized names indicate session organizers.

Notes

AG13 Budget

Conference Budget
SIAM Conference on Applied Algebraic Geometry
August 1 - 4, 2013
Colorado State University, Fort Collins, Colorado, USA

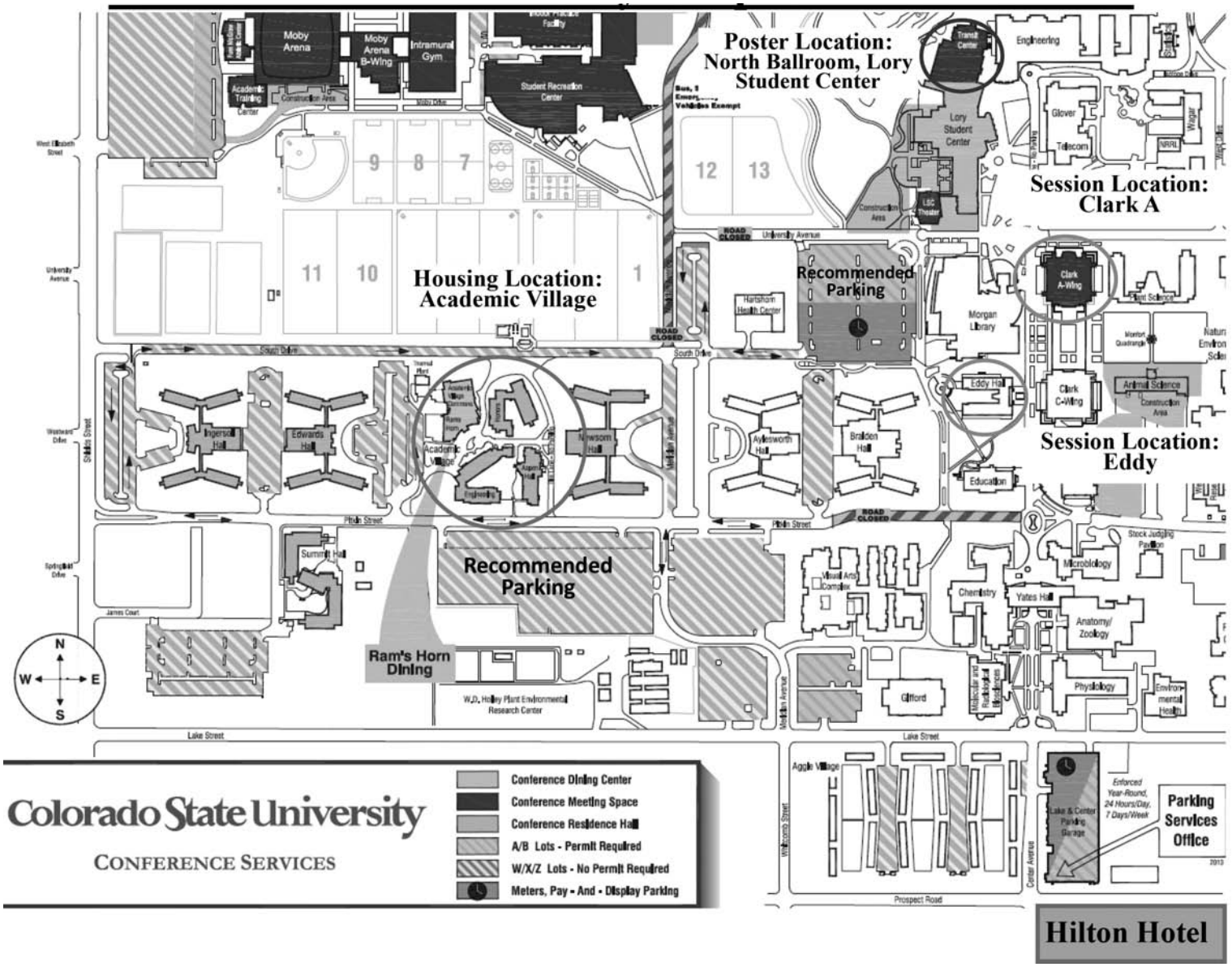
Expected Paid Attendance 320

Revenue		
Registration Income		$50,330
Total		$50,330
Expenses		
Printing		$1,734
Organizing Committee		$2,000
Invited Speakers		$10,500
Food and Beverage		$15,000
Room Rental		$19,098
Advertising		$7,200
Conference Labor (including benefits)		$30,977
Other (supplies, staff travel, freight, misc.)		$1,058
Administrative		$8,649
Accounting/Distribution & Shipping		$6,069
Information Systems		$8,267
Customer Service		$3,113
Marketing		$5,060
Office Space (Building)		$3,395
Other SIAM Services		$3,787
	Total	$125,907
Net Conference Expense		($75,577)
Support Provided by SIAM		$75,577
		$0

Estimated Support for Travel Awards not included above:

Post Docs and Students	18	$13,250

Colorado State University Map



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