Final Program and Abstracts

Figure courtesy Victor Chepoi, Hans-Juergen Bandelt, David Eppstein from SIDMA 24-4

SIAM Conference on DISCRETE MATHEMATICS

June 16-19, 2014
Hyatt Regency Minneapolis
Minneapolis, Minnesota, USA

Sponsored by the SIAM Activity Group on Discrete Mathematics

The SIAG on Discrete Mathematics focuses on combinatorics, graph theory, cryptography, discrete optimization, mathematical programming, coding theory, information theory, game theory, and theoretical computer science, including algorithms, complexity, circuit design, robotics, and parallel processing. This activity group provides an opportunity to unify pure discrete mathematics and areas of applied research such as computer science, operations research, combinatorics, and the social sciences. It organizes a biennial conference on discrete mathematics; co-sponsors, with ACM SIGACT, the annual Symposium on Discrete Algorithms; and sponsors minisymposia at SIAM meetings and conferences. The activity group also runs DM-Net, an electronic forum; publishes an electronic newsletter; and maintains a website and a member directory.

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Organizing Committee

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Sunday, June 15
5:00 PM - 8:00 PM

Monday, June 16
7:30 AM - 3:45 PM

Tuesday, June 17
8:15 AM - 3:45 PM

Wednesday, June 18
8:15 AM - 3:45 PM

Thursday, June 19
7:45 AM - 3:15 PM

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Hotel web address: *http://minneapolis.hyatt.com/en/hotel/home.html*

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

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Comments?

Comments about SIAM meetings are encouraged! Please send to:

Cynthia Phillips, SIAM Vice President for Programs (*vpp@siam.org*).

Get-togethers

- Welcome Reception
  Sunday, June 15
  6:00 PM – 8:00 PM

- Business Meeting
  (*open to SIAG/DM members*)
  Tuesday, June 17
  5:50 PM – 6:50 PM

  Complimentary beer and wine will be served.

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Invited Plenary Sessions

*** All Invited Plenary Presentations will take place in Greenway C-H ***

Monday, June 16

8:45 AM - 9:30 AM

IP1 The Graph Regularity Method

Jacob Fox, *Massachusetts Institute of Technology, USA*

2:00 PM - 2:45 PM

IP2 Rota's Conjecture

Jim Geelen, *University of Waterloo, Canada*

Tuesday, June 17

8:45 AM - 9:30 AM

IP3 Covering Systems of Congruences

Robert Hough, *Oxford University, United Kingdom*

2:00 PM - 2:45 PM

IP4 Submodular Functions and Their Applications

Jan Vondrak, *IBM Almaden Research Center, USA*

Invited Plenary Sessions

*** All Invited Plenary Presentations will take place in Greenway C-H ***

Wednesday, June 18

8:45 AM - 9:30 AM

IP5 Approximation Algorithms Via Matrix Covers

Noga Alon, *Tel Aviv University, Israel*

2:00 PM - 2:45 PM

IP6 Interlacing Families and Kadison--Singer

Adam Marcus, *Yale University, USA*

Thursday, June 19

8:15 AM - 9:00 AM

IP7 Hamilton Decompositions of Graphs and Digraphs

Daniela Kuhn, *University of Birmingham, United Kingdom*

1:30 PM - 2:15 PM

IP8 The Complexity of Graph and Hypergraph Expansion Problems

Santosh Vempala, *Georgia Institute of Technology, USA*

Hot Topic Session

*** The Hot Topic Session will take place in Greenway C-H ***

Monday, June 16
8:00 PM - 9 PM

Hot Topic Session: The Existence of Designs
Peter Keevash, *University of Oxford, United Kingdom*

Prize Lecture

*** The Prize Lecture will take place in Greenway C-H ***

Wednesday, June 18
8:00 PM - 8:45 PM

SP1 2014 Dénes König Prize Lecture – The Number of $K_{s,t}$-free Graphs
Wojciech Samotij, *Tel Aviv University, Israel*

SIAM Activity Group on Discrete Mathematics (SIAG/DM)

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A GREAT WAY TO GET INVOLVED!

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- Special sessions at SIAM Annual Meetings
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- Participation in the selection of SIAG/DM officers

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- $10 per year
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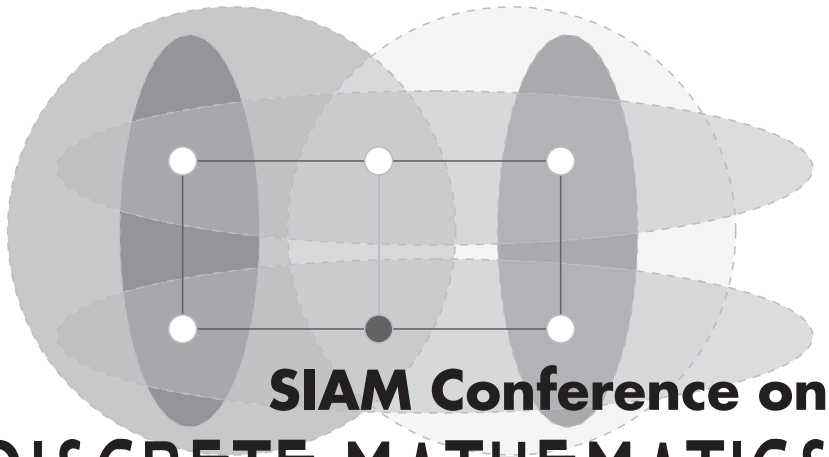

Figure courtesy Victor Chepoi, Hans-Juergen Bandelt, David Eppstein from SIDMA 24-4

SIAM Conference on

DISCRETE MATHEMATICS

June 16-19, 2014

Hyatt Regency Minneapolis

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Sunday, June 15

Registration
5:00 PM-8:00 PM

Room:Greenway Promenade

Welcome Reception
6:00 PM-8:00 PM

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Monday, June 16

Registration
7:30 AM-3:45 PM

Room:Greenway Promenade

Opening Remarks
8:30 AM-8:45 AM

Room:Greenway C-H

Monday, June 16

IP1

The Graph Regularity Method
8:45 AM-9:30 AM

Room:Greenway C-H

Chair: David Conlon, University of Oxford, United Kingdom

Szemerédi's regularity lemma is one of the most powerful tools in graph theory, with many applications in combinatorics, number theory, discrete geometry, and theoretical computer science. Roughly speaking, it says that every large graph can be partitioned into a small number of parts such that the bipartite subgraph between almost all pairs of parts is random-like. Several variants of the regularity lemma have since been established with many further applications. I will discuss recent progress in understanding the quantitative aspects of these lemmas and their applications.

Jacob Fox
Massachusetts Institute of Technology, USA

Coffee Break
9:30 AM-10:00 AM

Room:Greenway Promenade

Monday, June 16

MS1

Extremal Graph Theory - Part I of II

10:00 AM-12:30 PM

Room:Greenway C-H

For Part 2 see MS19

Many questions in Extremal Graph Theory can be formulated as follows: how does some (global) parameter force some (local) structure? An increasingly important trend in the area has been the use of probabilistic techniques and viewpoints. This approach has led to a number of recent successes and also to connections with other areas.

Organizer: Deryk Osthus
University of Birmingham, United Kingdom

10:00-10:25 A Refinement of the Ore-type Version of the Corrádi-Hajnal Theorem
Alexandr Kostochka, University of Illinois at Urbana-Champaign, USA

10:30-10:55 Cycle Packing
David Conlon, University of Oxford, United Kingdom; Jacob Fox, Massachusetts Institute of Technology, USA; Benjamin Sudakov, University of California, Los Angeles, USA

11:00-11:25 Robustness of Graphs - Case Study: Dirac's Theorem
Choongbum Lee, Massachusetts Institute of Technology, USA; Michael Krivelevich, Tel Aviv University, Israel; Benny Sudakov, ETH Zürich, Switzerland

11:30-11:55 Packing Trees of Bounded Degree
Mathias Schacht and Messuti Silvia, Universitat Hamburg, Germany; Vojtech Rödl, Emory University, USA

12:00-12:25 Proof of Two Conjectures of Thomassen on Tournaments
Daniela Kuhn, John Lapinskas, and *Deryk Osthus*, University of Birmingham, United Kingdom; Viresh Patel, Queen Mary University, London, United Kingdom; Timothy Townsend, University of Birmingham, United Kingdom

Monday, June 16

MS2

Combinatorics and Statistical Mechanics - Part I of II

10:00 AM-12:30 PM

Room:Greenway A

For Part 2 see MS34

Organizer: Richard Kenyon
Brown University, USA

10:00-10:25 Asymptotics of Symmetric Polynomials with Applications to Statistical Mechanics Models
Greta Panova, University of California, Los Angeles, USA

10:30-10:55 Electroid Varieties and a Compactification of the Space of Electrical Networks
Thomas Lam, University of Michigan, USA

11:00-11:25 Title Not Available at Time of Publication
Pavlo Pylyavskyy, University of Minnesota, USA

11:30-11:55 Arctic Curves of the Octahedron Equation
Rodrigo A. Soto Garrido and Philippe Di Francesco, University of Illinois at Urbana-Champaign, USA

12:00-12:25 Rowmotion, Homomesy, and the Razumov-Stroganov Ex-conjecture
Jessica Striker, North Dakota State University, USA

Monday, June 16

MS3

Positional and Combinatorial Games

10:00 AM-12:30 PM

Room:Greenway B

The theory of positional games is a rapidly evolving, relatively young topic that is deeply linked to several popular areas of Mathematics and Theoretical Computer Science, such as random graph theory, Ramsey theory, complexity theory and derandomization. Results on positional games have been used to make decisive progress in these areas.

Organizer: Dan Hefetz
University of Birmingham, United Kingdom

Organizer: Michael Krivelevich
Tel Aviv University, Israel

10:00-10:25 Does the Random Graph Intuition Help when Orientations are Involved?
Dennis Clemens, Freie Universität Berlin, Germany; Heidi Gebauer, ETH Zürich, Switzerland; *Anita Liebenau*, University of Warwick, United Kingdom

10:30-10:55 Generating Random Graphs in Biased Maker-Breaker Games
Ferber Asaf, ETH Zürich, Switzerland; Michael Krivelevich, Tel Aviv University, Israel; Humberto Naves, ETH Zürich, Switzerland

11:00-11:25 Maker-Breaker Games on Random Geometric Graphs
Andrew J. Beveridge, Macalester College, USA; Andrzej Dudek, Western Michigan University, USA; Alan Frieze, Carnegie Mellon University, USA; *Tobias Muller*, Utrecht University, The Netherlands; Milos Stojakovic, University of Novi Sad, Serbia

11:30-11:55 Walker vs Breaker
Lisa Espig and Alan Frieze, Carnegie Mellon University, USA; Michael Krivelevich, Tel Aviv University, Israel; *Wesley Pegden*, Carnegie Mellon University, USA

12:00-12:25 Picker-Chooser Fixed Graph Games
Malgorzata Bednarska-Bzdega, Adam Mickiewicz University, Poland; *Dan Hefetz*, University of Birmingham, United Kingdom; Tomasz Luczak, Adam Mickiewicz University, Poland

Monday, June 16

MS4

Selected Contributed Talks - Part I of II

10:00 AM-12:30 PM

Room:Greenway I

For Part 2 see MS39

This minisymposium consists of five contributed talks that were selected by the Organizing Committee.

Organizer: Sergey Norin
McGill University, Canada

10:00-10:25 σ-Polynomials and Their Roots
Jason Brown and A*ysel Erey*, Dalhousie University, Canada

10:30-10:55 4-coloring Graphs with No Induced 5-cycle and 6-vertex Path
Maria Chudnovsky, Peter Maceli, *Juraj Stacho*, and Mingxian Zhong, Columbia University, USA

11:00-11:25 Unique Vector Coloring
Robert Samal, Charles University, Czech Republic; David Roberson, Nanyang Technological University, Singapore

11:30-11:55 A Geometric Foundation to Information Networks
Dimitri Papadimitriou, Bell Laboratories, Lucent Technologies, USA

12:00-12:25 Independent Set, Induced Matching, and Pricing: Connections and Tight (Subexponential Time) Approximation Hardnesses
Bundit Laekhanukit, McGill University, Canada

Monday, June 16

MS5

Modeling Networks under Exact and Soft Constraints

10:00 AM-12:30 PM

Room:Greenway J

There is demand to produce random large networks with prescribed properties like degree sequence, assortativity or disassortativity, etc. The prescribed properties may be required in expectation, or exactly. This area is under intense study, current best methods involve fast convergent Markov chains, based on some swap operations, or the exponential random graph model, which is mostly pursued by physicists. While unsolved problems are abound, the logic of mathematical discovery already resulted in corresponding major open problems for hypergraphs. We bring together some of the best experts on this area.

Organizer: Laszlo Szekely
University of South Carolina, USA

Organizer: Eva Czabarka
University of South Carolina, USA

10:00-10:25 Constrained Graph Construction Problems for Network Modeling Purposes
Zoltan Toroczkai, University of Notre Dame, USA

10:30-10:55 Sampling Graphs Using Markov Chains
Catherine Greenhill, University of New South Wales, Australia

11:00-11:25 Networks with Similar Assortativity - JDMs and PAMs
Eva Czabarka, University of South Carolina, USA

11:30-11:55 Hypergraph Problems Arising from Networks in Algebraic Statistics
Sonja Petrovic, Illinois Institute of Technology, USA

12:00-12:25 Subgraphs in Random Non-uniform Hypergraphs
Edward Boehnlein and Linyuan Lu, University of South Carolina, USA

Monday, June 16

MS6

Graph Homomorphisms: Edge Colours, Signs, and Crossings

10:00 AM-12:30 PM

Room:Skyway A

Homomorphisms are structure preserving maps which are natural objects of study in mathematics. In graph theory they are defined as edge preserving vertex maps. One may impose additional restrictions on how the edges map through the use of edge-colours, signs, or geometric properties like crossing. Such restrictions lead to interesting results along the lines of complexity, duality, and structural characterizations. The minisymposium consists of: an introduction to homomorphisms with edge constraints; a talk examining the key role edge-colours and switching plays in their study; two talks on signed graph homomorphisms; and a geometric restriction based on crossing edges.

Organizer: Richard Brewster
Thompson Rivers University, Canada

Organizer: Gary MacGillivrary
University of Victoria, Canada

10:00-10:25 Graph Homomorphisms: Edge Colours, Signs, and Crossings, An Introduction
Richard Brewster, Thompson Rivers University, Canada

10:30-10:55 Colourings of Edge-Coloured Graphs and the Vertex Switching Operation
Gary MacGillivrary and J. Maria Warren, University of Victoria, Canada

11:00-11:25 Signed Graph Homomorphisms
Reza Naserasr, CNRS, France

11:30-11:55 Complexity of Signed Graph Homomorphisms
Richard Brewster, Thompson Rivers University, Canada; *Florent Foucaud*, Université Paris Dauphine, France; Pavol Hell, Simon Fraser University, Canada; Reza Naserasr, CNRS, France

12:00-12:25 Geometric Homomorphisms and the Geochromatic Number
Debra L. Boutin and Sally Cockburn, Hamilton College, USA; Alice M. Dean, Skidmore College, USA

Monday, June 16

MS7

Posets - Part I of II

10:00 AM-12:30 PM

Room:Skyway B

For Part 2 see MS25

The sessions will feature international experts presenting their research on the combinatorics of finite partially ordered sets (posets). We are interested in the structure and extremal properties of posets and set systems, building on work over the last 90 years. Talks will address dimension theory, Sperner theory, algorithms for partitioning posets, and applications. Some will concern a problem that has attracted considerable interest in the past ten years: Given a finite poset P, what is the maximum size La(n,P) of a family of subsets of an n-set that contains no subfamily P?

Organizer: Jerry Griggs
University of South Carolina, USA

10:00-10:25 Largest Union-intersecting Families
Gyula Katona, Hungarian Academy of Sciences, Hungary

10:30-10:55 Extremal Problems on Posets and Hypergraphs
Linyuan Lu and Travis Johnston, University of South Carolina, USA

11:00-11:25 Estimation of the Size of Families Not Containing the Given Posets
Hong-Bin Chen, Academia Sinica, China; *Wei-Tian Li*, National Chung-Hsing University, Taiwan

11:30-11:55 Packing Posets in the Boolean Lattice
Andrew Dove and J*erry Griggs*, University of South Carolina, USA

12:00-12:25 Recent Progress on Diamond-free Families
Lucas J. Kramer, *Ryan R. Martin*, and Michael Young, Iowa State University, USA

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Monday, June 16

IP2

Rota's Conjecture

2:00 PM-2:45 PM

Room:Greenway C-H

Chair: Pavol Hell, Simon Fraser University, Canada

In 1970, Gian-Carlo Rota posed a conjecture giving a succinct combinatorial characterization of the linear dependencies among a finite set of vectors in a vector space over any given finite field. I will discuss the conjecture as well as joint work with Bert Gerards and Geoff Whittle that led to a solution.

Jim Geelen
University of Waterloo, Canada

Coffee Break

2:45 PM-3:15 PM

Room:Greenway Promenade

Monday, June 16

MS8

Ramsey Theory - Part I of II

3:15 PM-5:45 PM

Room:Greenway C-H

For Part 2 see MS36

There has recently been many exciting developments in Ramsey theory. This minisymposium will cover some of these important recent advances in the area, including graph Ramsey theory, Ramsey numbers, and Ramsey theorems in random structures.

Organizer: Jacob Fox
Massachusetts Institute of Technology, USA

Organizer: Andrey Grinshpun
Massachusetts Institute of Technology, USA

3:15-3:40 Sharp Thresholds for Van Der Waerden's Theorem
Mathias Schacht, Universitat Hamburg, Germany; Ehud Friedgut, Weizmann Institute of Science, Israel; Hiep Han, Emory University, USA; Yury Person, University of Frankfurt, Germany

3:45-4:10 Ordered Ramsey Numbers
David Conlon, University of Oxford, United Kingdom; Jacob Fox and Choongbum Lee, Massachusetts Institute of Technology, USA; Benny Sudakov, ETH Zürich, Switzerland

4:15-4:40 Solution to the Erdös-Gyárfás Conjecture on Generalized Ramsey Numbers
Choongbum Lee, Massachusetts Institute of Technology, USA; David Conlon, University of Oxford, United Kingdom; Jacob Fox, Massachusetts Institute of Technology, USA; Benny Sudakov, ETH Zürich, Switzerland

4:45-5:10 On the Ramsey Number of the Clique and the Hypercube
Jozef Skokan, London School of Economics, United Kingdom

5:15-5:40 On the Size Ramsey Numbers and their Variations
Andrzej Dudek, Western Michigan University, USA

Monday, June 16

MS9

Graph Colouring - Part I of II

3:15 PM-5:45 PM

Room:Greenway A

For Part 2 see MS37

Graph colorings and other restricted partitions play a central role in discrete mathematics. They also have numerous practical applications. New theoretical and algorithmic results on graph colorings will be presented in this minisymposium.

Organizer: Zdenek Dvorak
Charles University, Czech Republic

3:15-3:40 Colorings and Independent Sets of Triangle-Free Planar Graphs
Zdenek Dvorak, Charles University, Czech Republic; Matthias Mnich, Max Planck Institute for Informatics, Germany

3:45-4:10 Subcubic Triangle-free Graphs have Fractional Chromatic Number at most 14/5
Zdenek Dvorak, Charles University, Czech Republic; Jean-Sébastien Sereni, CNRS, France; *Jan Volec*, University of Warwick, United Kingdom

4:15-4:40 Acyclic List Coloring on Planar Graphs
Min Chen, Zhejiang Normal University, China; Andre Raspaud, Universite de Bordeaux I, France

4:45-5:10 Algorithms to Color Sparse Graphs
Matthew Yancey, University of Illinois at Urbana-Champaign, USA

5:15-5:40 On Thue Colourings of Graphs
Erika Skrabulakova, Technical University of Kosice, Slovakia; Jens Schreyer, Technical University of Ilmenau, Germany

Monday, June 16

MS10

Discrete Geometry - Part I of II

3:15 PM-5:15 PM

Room:Greenway B

For Part 2 see MS14

The minisymposium aims to appeal to the visual and combinatorial senses of the audience. Topics that are likely to be mentioned: nice arrangements of points and lines, overlaps between geometric shapes, connections to combinatorial number theory, Ramsey-type theorems for points and curves, computational problems, and of course the new and unexpected.

Organizer: Boris Bukh
Carnegie Mellon University, USA

3:15-3:40 Simplifying Inclusion - Exclusion Formulas
Xavier Goaoc, Université Paris-Est Marne-la-Vallée, France

3:45-4:10 Erdös--Szekeres-type Statements in Dimension 1
Boris Bukh, Carnegie Mellon University, USA; Jiri Matousek, Charles University, Czech Republic

4:15-4:40 Splitting Points and Hyperplanes
Pablo Soberón, University of Michigan, USA; Edgardo Roldán-Pensado, Universidad Nacional Autónoma de México, Mexico

4:45-5:10 The Cylindrical Crossing Number of the Complete Bipartite Graph
Athena C. Sparks and Silvia Fernandez, California State University, Northridge, USA

Monday, June 16

MS11

Spectral Graph Theory - Part I of II

3:15 PM-5:15 PM

Room:Greenway I

For Part 2 see MS29

Spectral graph theory studies structural properties of graphs by the use of eigenvalues of various associated matrices. In this minisymposium, we focus on applications of spectral analysis to wider topics in graph theory, as well as behavior of the spectrum of a graph under various perturbations and operations.

Organizer: Mary Radcliffe
University of Washington, USA

Organizer: Stephen J. Young
University of Louisville, USA

3:15-3:40 An Alon-Boppana Result for the Normalized Laplacian
Stephen J. Young, University of Louisville, USA

3:45-4:10 The Spectrum of Erdos-Renyi Random Graphs Near the Connectivity Threshold
Christopher Hoffman, University of Washington, USA; Matt Kahle, The Ohio State University, USA; Elliot Paquette, Weizmann Institute of Science, Israel

4:15-4:40 Gaps in Eigenfunctions of Graphs
Fan Chung-Graham, University of California, San Diego, USA

4:45-5:10 Interlacing Families and Bipartite Ramanujan Graphs
Adam Marcus, Yale University, USA

Monday, June 16

CP1

Random Structures

3:15 PM-5:15 PM

Room:Greenway J

Chair: Dana Randall, Georgia Institute of Technology, USA

3:15-3:30 Degeneracy in R-Mat Generated Graphs
Alex Chin, North Carolina State University, USA; Timothy Goodrich, Valparaiso University, USA; Blair Sullivan, North Carolina State University, USA

3:35-3:50 Percolation in the Weighted Random Connection Model
Milan Bradonjic, Bell Labs, Alcatel-Lucent, USA

3:55-4:10 De-Preferential Attachment Random Graphs
Subhabrata Sen, Stanford University, USA; Antar Bandyopadhyay, Indian Statistical Institute, India

4:15-4:30 Identifying Codes and Searching with Balls in Graphs
Younjin Kim, KAIST, Korea; Mohit Kumbhat, Sungkyunkwan University, Korea; Zoltan Nagy and Balazs Patkos, Renyi Institute, Hungary; Alexey Pokrovskiy, Freie Universität Berlin, Germany; Mate Vizer, Renyi Institute, Hungary

4:35-4:50 Hyperbolicity of Random Intersection Graphs
Matthew Farrell, Cornell University, USA; Timothy Goodrich, Valparaiso University, USA; *Nathan Lemons*, Los Alamos National Laboratory, USA; Blair Sullivan, North Carolina State University, USA

4:55-5:10 Anti-Ramsey Number of Matchings in Hypergraphs
Lale Ozkahya, Hacettepe Universýty, Turkey; Michael Young, Iowa State University, USA

Monday, June 16

CP2

Applications

3:15 PM-5:35 PM

Room:Skyway A

Chair: Anthony Bonato, Ryerson University, Canada

3:15-3:30 Accumulation Behavior and Product Forecasting
Thomas Morrisey, Information Systems Laboratories, USA

3:35-3:50 Various Notions and Generalizations of Algebraically Coded Security System with Applications to Security and Privacy
Benard O. Nyaare, Jaramogi Oginga Odinga University of Science and Technology, Kenya

3:55-4:10 Statistical and Hierarchical Graph Analysis for Cyber Security
Emilie Hogan, Sutanay Choudhury, Peter Hui, and Cliff Joslyn, Pacific Northwest National Laboratory, USA

4:15-4:30 Qubit Unextendible Product Bases
Nathaniel D. Johnston, University of Waterloo, Canada

4:35-4:50 Online Streaming of Intersection Graphs
Sandeep Koranne, Mentor Graphics Corporation, USA

4:55-5:10 The Balance Optimization Subset Selection (boss) Model for Causal Inference
Sheldon H. Jacobson, University of Illinois at Urbana-Champaign, USA; Jason Sauppe, University of Illinois, USA; Edward Sewell, Southern Illinois University, Edwardsville, USA

5:15-5:30 A Predictive Model for Gis
Jorge Diaz-Castro, University of Puerto Rico, Puerto Rico

Monday, June 16

CP3

Matroids, Arrangements, Large Networks

3:15 PM-5:35 PM

Room:Skyway B

Chair: David A. Pike, Memorial University, Newfoundland, Canada

3:15-3:30 Maps on Surfaces and Matroids
Goran Malic, University of Manchester, United Kingdom

3:35-3:50 On the Number of Bases in a Matroid
Wing Hong Tony Wong, Kutztown University of Pennsylvania, USA; Sin Tsun Edward Fan, California Institute of Technology, USA

3:55-4:10 The Global Invariant of Graphic Hyperplane Arrangements
Guangfeng Jiang, Qiumin Guo, Wentao Hu, and Ling Guo, Beijing University of Chemical Technology, China

4:15-4:30 The Abstract Algebra of Big Data and Associative Arrays
Jeremy Kepner and *Julian Chaidez*, Massachusetts Institute of Technology, USA

4:35-4:50 Necessarily Flat Polytopes
Joshua B. Tymkew, Western Michigan University, USA

4:55-5:10 Aliens Vs Zombies: An Introduction To Bipartite Dot Product Graphs
Sean Bailey and David E. Brown, Utah State University, USA

5:15-5:30 On the Type(s) of Minimum Size Subspace Partitions
Esmeralda L. Nastase, Xavier University, USA

Dinner Break

5:45 PM-8:00 PM

Attendees on their own

Monday, June 16

Hot Topic Session:

The Existence of Designs

8:00 PM-9:00 PM

Room:Greenway C-H

Chair: Ron Graham, University of California, San Diego, USA

We prove the existence conjecture for combinatorial designs, answering a question of Steiner from 1853. More generally, we show that the natural divisibility conditions are sufficient for clique decompositions of simplicial complexes that satisfy a certain pseudorandomness condition.

Peter Keevash
University of Oxford, United Kingdom

Tuesday, June 17

Registration

8:15 AM-3:45 PM

Room:Greenway Promenade

IP3

Covering Systems of Congruences

8:45 AM-9:30 AM

Room:Greenway C-H

Chair: Jozsef Solymosi, University of British Columbia, Canada

A distinct covering system of congruences is a collection $a_i \bmod m_i$, $1< m_1 < m_2 < ... < m_k$, whose union is the integers. Covering systems were introduced by Paul Erdos, who used the system

$$\mathbb{Z} = (0 \bmod 2) \cup (0 \bmod 3) \cup (1 \bmod 4) \cup (3 \bmod 8) \cup (7 \bmod 12) \cup (23 \bmod 24)$$

to produce an odd arithmetic progression none of whose members is of the form a prime plus a power of two. Two well-known questions of Erdos concern covering systems. The minimum modulus problem asks if there exist distinct covering systems for which m1 is arbitrarily large. The odd modulus problem asks for a distinct covering system with all moduli odd. I will describe aspects of my negative answer to the minimum modulus problem and ongoing joint work with Pace Nielsen toward the odd modulus problem. The arguments involve techniques from graph theory and PDE.

Robert Hough
Oxford University, United Kingdom

Coffee Break

9:30 AM-10:00 AM

Room:Greenway Promenade

Tuesday, June 17

MS12

Graph Polynomials: Towards a General Theory - Part I of II

10:00 AM-12:00 PM

Room:Greenway C-H

For Part 2 see MS43

The last ten years have seen increased activity in the study of graph invariants in the form of partition functions, generalized chromatic polynomials and subgraph-counting generating functions. A general theory is gradually emerging that brings together the seemingly disjunct objects, techniques and concepts that have hitherto characterized the area of polynomial graph invariants, now over a century old since Birkhoff's introduction of the chromatic polynomial in 1912. The purpose of this minisymposium is to provide a forum for different directions of contemporary research on graph polynomials with a view to further developing this unifying approach.

Organizer: Johann A. Makowsky
Technion - Israel Institute of Technology, Israel

Organizer: Andrew J. Goodall
Charles University, Czech Republic

Organizer: Joanna Ellis-Monaghan
Saint Michael's College, USA

10:00-10:25 Generalized Chromatic Polynomials
Tomer Kotek, Vienna University of Technology, Austria; *Janos Makowsky*, Technion Israel Institute of Technology, Israel

10:30-10:55 Algebraic Properties of the Chromatic Polynomial
Kerri Morgan and Graham Farr, Monash University, Australia

11:00-11:25 Counting Cuts, Matchings, Bipartite Subgraphs, and Dominating Sets: The Bipartition Polynomial of a Graph
Peter Tittmann, University of Applied Sciences, Germany

11:30-11:55 Caterpillars and the U-polynomial
Jose Zamora, Universidad Andres Bello, Santiago, Chile

Tuesday, June 17

MS13

Biological Networks

10:00 AM-12:30 PM

Room:Greenway A

Discrete Mathematics and Graph Theoretic Techniques can be useful for studying real biological networks. We look at some current research and directions in the field.

Organizer: Lenore J. Cowen
Tufts University, USA

10:00-10:25 New Metrics for Protein Interaction Networks
Lenore J. Cowen, Mengfei Cao, Hao Zhang, and Jisoo Park, Tufts University, USA; Noah Daniels, Massachusetts Institute of Technology, USA; Mark Crovella, Boston University, USA; Ben Hescott, Tufts University, USA

10:30-10:55 Large Highly Connected Clusters in Protein-Protein Interaction Networks
Debra Goldberg, University of Colorado Boulder, USA

11:00-11:25 Efficiently Enumerating All Connected Induced Subgraphs of a Large Molecular Network
Mehmet Koyuturk, Sean Maxwell, and Mark Chance, Case Western Reserve University, USA

11:30-11:55 Network-Based Rnaseq Quantification and Survival Analysis for Cancer Genomics
Wei Zhang and Baolin Wu, University of Minnesota, USA; Hui Zheng, Guangzhou University, China; *Rui Kuang*, University of Minnesota, USA

12:00-12:25 Computational Approaches for Analyzing Large-scale Genetic Interaction Networks
Chad Myers, University of Minnesota, USA

Tuesday, June 17

MS14

Discrete Geometry - Part II of II

10:00 AM-12:30 PM

Room:Greenway B

For Part 1 see MS10
The minisymposium aims to appeal to the visual and combinatorial senses of the audience. Topics that are likely to be mentioned: nice arrangements of points and lines, overlaps between geometric shapes, connections to combinatorial number theory, Ramsey-type theorems for points and curves, computational problems, and of course the new and unexpected.

Organizer: Boris Bukh
Carnegie Mellon University, USA

10:00-10:25 Embeddability in the 3-sphere is Decidable
Jiři Matoušek, Charles University, Czech Republic; Eric Sedgwick, DePaul University, USA; *Martin Tancer* and Uli Wagner, IST, Austria

10:30-10:55 On the Number of Plane Graphs with Polyline Edges
Csaba D. Toth, California State University, Northridge, USA

11:00-11:25 Delaunay Complexes, Noneuclidean Geometry, and Complexity
Igor Rivin, Brown University, USA

11:30-11:55 Space Curve Arrangements with Many Incidences
Josh Zahl, Massachusetts Institute of Technology, USA

12:00-12:25 Improvements on the Elekes-Rónyai Method
Jozsef Solymosi, University of British Columbia, Canada; Micha Sharir and Orit Raz, Tel Aviv University, Israel

Tuesday, June 17

MS15

Pursuit Games on Graphs - Part I of II

10:00 AM-12:30 PM

Room:Greenway I

For Part 2 see MS45
Pursuit games on graphs originated in the early eighties with the introduction of the Game of Cops and Robbers. Since then, researchers have investigated a variety of pursuit games focussed on capture, containment or control of an adversary. The last decade has witnessed a wealth of pursuit game results in structural, probabilistic and algorithmic graph theory. This minisymposium will bring together leading researchers in the field to discuss state-of-the-art work on the subject.

Organizer: Andrew J. Beveridge
Macalester College, USA

10:00-10:25 The Robber Strikes Back
Anthony Bonato, Ryerson University, Canada

10:30-10:55 Edge Contraction and Cop-Win Critical Graphs
Shannon L. Fitzpatrick, University of Prince Edward Island, Canada; Ben Cameron, Dalhousie University, Canada

11:00-11:25 Cops and Invisible Robbers
Dariusz Dereniowski, Gdansk University of Technology, Poland; *Danny Dyer* and Ryan Tifenbach, Memorial University, Newfoundland, Canada; Boting Yang, University of Regina, Canada

11:30-11:55 Fighting Fires on Layered Grids
Amir Barghi and Nicole Rosato, Bard College, USA

12:00-12:25 Ambush Cops and Robbers on Graphs with Small Girth
Nancy E. Clarke, Acadia University, Canada

Tuesday, June 17

MS16

Cycles and Paths in Graphs - Part I of II

10:00 AM-12:30 PM

Room:Greenway J

For Part 2 see MS30

Finding special cycles/paths has been a fundamental, yet difficult, problem in graph theory. This minisymposium focuses on the recent progresses in finding long cycles (including hamiltonian cycles), spectra of cycle lengths, and cycle structural of special graphs.

Organizer: Guantao Chen
Georgia State University, USA

10:00-10:25 Long Cycles in Graphs with Bounded Degrees
Guantao Chen, Georgia State University, USA; Zhicheng Gao, Carleton University, Canada; Songling Shan, Georgia State University, USA; Xingxing Yu, Georgia Institute of Technology, USA; Wenan Zang, University of Hong Kong, China

10:30-10:55 Minimum Degree and Disjoint Cycles in Generalized Claw-free Graphs
Ralph Faudree, University of Memphis, USA

11:00-11:25 On Chorded Cycles
Ronald Gould, Emory University, USA

11:30-11:55 Vertex-Disjoint Theta Subgraphs
Shinya Fujita, Yokohama National University, Japan; *Katsuhiro Ota*, Keio University, Japan; Tadashi Sakuma, Yamagata University, Japan

12:00-12:25 Halin Graphs and Generalized Halin Graphs
Shoichi Tsuchiya, Tokyo University of Science, Japan

Tuesday, June 17

MS17

Extremal Combinatorics

10:00 AM-12:30 PM

Room:Skyway A

Extremal Combinatorics is a fast developing and important area within Combinatorics that investigates the extrema of parameters of combinatorial objects such as codes, graphs, hypergraphs, set systems, etc. It has applications in many fields, including number theory, optimization, theoretical computer science, and etc. Here we focus on Turan type extremal problems, which ask how large/dense a system can be subject to some local constraints; for instance the constraints may be the avoidance of some substructures. The talks will cover a wide spectrum of results of such nature, discussing latest tools used in solving these problems, and suggesting new directions for future developments.

Organizer: Tao Jiang
Miami University, USA

10:00-10:25 Turan Problem for Hypergraph Forests
Tao Jiang, Miami University, USA

10:30-10:55 Large Forbidden Configurations
Richard P. Anstee, University of British Columbia, Canada; Attila Sali, Alfréd Rényi Institute of Mathematics, Hungary

11:00-11:25 Turán Numbers for Bipartite Graphs Plus Odd Cycles
Jacques Verstraete, University of California, San Diego, USA

11:30-11:55 Maximizing the Number of Nonnegative Subsets
Hao Huang, Rutgers University, USA

12:00-12:25 The Manickam-Miklós-Singhi Conjectures for Sets and Vector Spaces
Ameera Chowdhury, Carnegie Mellon University, USA; Ghassan Sarkis and Shahriar Shahriari, Pomona College, USA

Tuesday, June 17

MS18

Variations within Chromatic Graph Theory

10:00 AM-12:30 PM

Room:Skyway B

Classical vertex-coloring of graphs has led to many intriguing variations. The edge-coloring equivalent of the four-color problem was known early, and both colorings were investigated also on nonplanar surfaces. Soon algebraic, as well as topological methods, developed as with graph automorphism groups. Also extensions of precolorings were studied, their existence and multiplicities. In this session we will hear talks on edge-coloring of snarks on the Klein bottle, some map color theorems on surfaces, the distinguishing chromatic number of planar graphs, defining sets for graph colorings and their connections with critical sets in Latin squares and Sudoku.

Organizer: Joan P. Hutchinson
Macalester College, USA

10:00-10:25 Small Snarks and 6-chromatic Triangulations on the Klein Bottle
Sarah-Marie Belcastro, Smith College, USA

10:30-10:55 Coloring Maps on Surfaces
Atsuhiro Nakamoto, Yokohama National University, Japan

11:00-11:25 Distinguishing Colorings of 3-regular Maps on Closed Surfaces
Seiya Negami, Yokohama National University, Japan

11:30-11:55 Sudoku, Latin Squares, and Defining Sets in Graph Coloring
Mohammed Mahdian, Google, Inc., USA

12:00-12:25 Defining Sets in Graph Coloring
Ebadollah S. Mahmoodian, Sharif University of Technology, Iran

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Tuesday, June 17

IP4

Submodular Functions and Their Applications

2:00 PM-2:45 PM

Room:Greenway C-H

Chair: William T. Trotter, Georgia Institute of Technology, USA

Submodular functions, a discrete analogue of convex functions, have played a fundamental role in combinatorial optimization since the 1970s. In the last decade, there has been renewed interest in submodular functions due to their role in algorithmic game theory, as well as numerous applications in machine learning. These developments have led to new questions as well as new algorithmic techniques. I will discuss the concept of submodularity, its unifying role in combinatorial optimization, and a few illustrative applications. I will describe some recent algorithmic advances, in particular the concept of multilinear relaxation, and the role of symmetry in proving hardness results for submodular optimization. I will conclude by discussing possible extensions of the notion of submodularity, and some future challenges.

Jan Vondrak
IBM Almaden Research Center, USA

Coffee Break

2:45 PM-3:15 PM

Room:Greenway Promenade

Tuesday, June 17

MS19

Extremal Graph Theory - Part II of II

3:15 PM-5:45 PM

Room:Greenway C-H

For Part 1 see MS1

Many questions in Extremal Graph Theory can be formulated as follows: how does some (global) parameter force some (local) structure? An increasingly important trend in the area has been the use of probabilistic techniques and viewpoints. This approach has led to a number of recent successes and also to connections with other areas.

Organizer: Deryk Osthus
University of Birmingham, United Kingdom

3:15-3:40 The Structure of Digraphs not Containing a Fixed Subgraph
Daniela Kuhn, Deryk Osthus, and Timothy Townsend, University of Birmingham, United Kingdom; *Yi Zhao*, Georgia State University, USA

3:45-4:10 The Typical Structure of Sparse H-free Graphs
Jozsef Balogh, University of Illinois, USA; Robert Morris, IMPA, Brazil; *Wojciech Samotij*, Tel Aviv University, Israel; Lutz Warnke, University of Oxford, United Kingdom

4:15-4:40 A Blow-up Lemma for Sparse Pseudorandom Graphs
Peter Allen and Julia Boettcher, London School of Economics, United Kingdom; Hiep Han, Emory University, USA; Yoshiharu Kohayakawa, Universidade de Sao Paulo, Brazil; *Yury Person*, University of Frankfurt, Germany

4:45-5:10 Properly Coloured Hamilton Cycles in Edge-coloured Complete Graphs
Allan Lo, University of Birmingham, United Kingdom

5:15-5:40 Decomposition of Random Graphs into Complete Bipartite Graphs
Xing Peng and Fan Chung, University of California, San Diego, USA

Tuesday, June 17

MS20

Graph Structure - Part I of II

3:15 PM-5:45 PM

Room:Greenway A

For Part 2 see MS27

Structural graph theory seeks to characterize graph properties by classifying all obstructions to the properties. The methodology has produced numerous results in the study of graph minors and other containment relations as well as graph algorithms, graph coloring, and problems on paths and cycles.

Organizer: Paul Wollan
University of Rome La Sapienza, Italy

3:15-3:40 Packing *A*-paths with Specified Endpoints
Daniel Marx, Hungarian Academy of Sciences, Hungary; *Paul Wollan*, University of Rome La Sapienza, Italy

3:45-4:10 Unavoidable Vertex-minors in Large Prime Graphs
O-Joung Kwon and *Sang-Il Oum*, KAIST, Korea

4:15-4:40 A Refinement of the Grid Theorem
Jim Geelen and *Benson Joeris*, University of Waterloo, Canada

4:45-5:10 Size Conditions for Rainbow Matchings
David M. Howard, Colgate University, USA

5:15-5:40 Packing Edge-Disjoint Odd S-Cycles in 4-Edge-Connected Graphs
Yusuke Kobayashi and Naonori Kakimura, University of Tokyo, Japan; Ken-ichi Kawarabayashi, National Institute of Informatics, Japan

Tuesday, June 17

MS21

Combinatorial Design Theory- Part I of II

3:15 PM-5:45 PM

Room:Greenway B

For Part 2 see MS38

In the past fifty years, combinatorial design theory has developed into a vibrant independent branch of combinatorics, with its own aims, methods and problems. It has found substantial applications in other branches of combinatorics, in graph theory, coding theory and cryptography, theoretical computer science, statistics, and algebra, among others. The talks in this Minisymposium will reflect the wide variety of problems and challenges of modern design theory, by including topics in resolvable designs, latin squares, one-factorizations, triple systems, large sets, and embeddings.

Organizer: Alexander Rosa
McMaster University, Canada

3:15-3:40 How to Squash a 6-Cycle System into a Steiner Triple System
Charles C. Lindner, Auburn University, USA

3:45-4:10 Resolvable Or Near Resolvable Designs in Multiple Rooms
Marco Buratti, Università di Perugia, Italy

4:15-4:40 On Large Sets of Combinatorial Objects
Spyros S. Magliveras, Florida Atlantic University, USA

4:45-5:10 Vertex-transitive Graphs of Prime-squared Order are Hamilton-decomposable
Donald L. Kreher, Michigan Technological University, USA

5:15-5:40 A Three-Factor Product Construction for Mutually Orthogonal Latin Squares
Peter Dukes, University of Victoria, Canada

Tuesday, June 17

MS22

Graph Limits and Flag Algebras

3:15 PM-5:45 PM

Room:Greenway I

Limits of discrete structures form an emerging area of combinatorics with many exciting results and open problems. There are notions of limits of various discrete structures (graphs, hypergraphs, partial orders, permutations). Probably, the case of dense graphs developed in a series of papers by Borgs, Chayes, Lovasz, Sos, Szegedy and Vesztergombi is the most understood. The limit theory is also related to a notion of flag algebras, introduced by Razborov, that offers a framework for computer assistance with searching for assymptotically true inequalities in discrete structures. The minisymposium will offer a sample of some recent results from this area.

Organizer: Daniel Kral
University of Warwick, United Kingdom

Organizer: Norin Sergey
Princeton University, USA

3:15-3:40 Finitely Forcible Graphons
Roman Glebov, ETH Zürich, Switzerland

3:45-4:10 Estimating the Distance from Testable Properties
Hamed Hatami, Princeton University, USA

4:15-4:40 The Inducibility of Directed Graphs
Hao Huang, Rutgers University, USA

4:45-5:10 First Order Limits
Daniel Kral, University of Warwick, United Kingdom; Martin Kupec, Charles University, Czech Republic; Anita Liebenau, University of Warwick, United Kingdom; Lukas Mach and Vojtech Tuma, Charles University, Czech Republic

5:15-5:40 Rainbow Triangles in Three-colored Graphs
Jozsef Balogh, University of Illinois, USA; Ping Hu, University of Illinois at Urbana-Champaign, USA; *Bernard Lidicky*, University of Illinois, Urbana, USA; Florian Pfender, University of Colorado, Denver, USA; Jan Volec, University of Warwick, United Kingdom; Michael Young, Iowa State University, USA

Tuesday, June 17

MS23

Geometric Representations of Graphs

3:15 PM-5:45 PM

Room:Greenway J

Visualizations and representations of graphs by means of intersections or contacts of geometric objects have been widely investigated. Classical examples are interval graphs and Koebe circle representations. When representations are given they can sometimes be exploited in optimization problems or to obtain deep structural results. In many instances these problems are hard for general graphs but become polynomial-time solvable when restricted to intersection or contact graphs with a given representations. Another class of problems is to compute the representation or to decide whether it exists. We highlight some recent developments in this active area at the intersection of graph theory and discrete geometry.

Organizer: Steven Chaplick
Technische Universität Berlin, Germany

3:15-3:40 Extending Partial Representations of Circle Graphs
Steven Chaplick, Technische Universität Berlin, Germany; Radoslav Fulek, Columbia University, USA; Pavel Klavik, Charles University, Czech Republic

3:45-4:10 Contact Representations of Planar Graph: Rebuilding Is Hard
Jan Kratochvil, Charles University, Czech Republic; Steven Chaplick, Technische Universität Berlin, Germany; Paul Dorbec and Mickael Montassier, ; Juraj Stacho, Columbia University, USA

4:15-4:40 The Recognition of Simple-Triangle Graphs and of Linear-Interval Orders is Polynomial
George B. Mertzios, Durham University, United Kingdom

4:45-5:10 Coloring Geometric Intersection Graphs via on-line Games
Tomasz Krawczyk and *Bartosz Walczak*, Jagiellonian University, Poland

5:15-5:40 Picking Planar Edges; Or, Drawing a Graph with a Planar Subgraph
Marcus Schaefer, DePaul University, USA

Tuesday, June 17

MS24

Polymer Models and Combinatorics - Part I of III

3:15 PM-5:45 PM

Room:Skyway A

For Part 2 see MS31

The minisymposium will cover some recent results related to applications of discrete mathematics and combinatorics to biology, chemistry and physics. One focus will be on applications to polymer and biopolymer modelling but other related methods and models will be discussed.

Organizer: Christine Soteros
University of Saskatchewan, Canada

3:15-3:40 Pulling Self-avoiding Walks from an Adsorbing Plane
EJ Janse van Rensburg, York University, Canada

3:45-4:10 On the Number of Walks in a Triangular Domain
Thomas Prellberg and Paul Mortimer, Queen Mary University, London, United Kingdom

4:15-4:40 Random Knots and Polymer Models
De Witt L. Sumners, Florida State University, USA

4:45-5:10 The Systematic Application of Analytic Combinatorics of Several Variables to Lattice Path Enumeration Problems
Marni Mishna, Simon Fraser University, Canada

5:15-5:40 Numerical Approach of Two Friendly Walks in a Sticky Slab
Thomas Wong, University of British Columbia, Canada

Tuesday, June 17

MS25

Posets - Part II of II

3:15 PM-5:45 PM

Room:Skyway B

For Part 1 see MS7

The sessions will feature international experts presenting their research on the combinatorics of finite partially ordered sets (posets). We are interested in the structure and extremal properties of posets and set systems, building on work over the last 90 years. Talks will address dimension theory, Sperner theory, algorithms for partitioning posets, and applications. Some will concern a problem that has attracted considerable interest in the past ten years: Given a finite poset P, what is the maximum size La(n,P) of a family of subsets of an n-set that contains no subfamily P?

Organizer: Jerry Griggs
University of South Carolina, USA

3:15-3:40 Planar Posets and Minimal Elements
William T. Trotter and Ruidong Wang, Georgia Institute of Technology, USA

3:45-4:10 On the Dimension of Posets with Cover Graphs of Treewidth *2*
Gwenael Joret, University of Melbourne, Australia; Piotr Micek, Jagiellonian University, Poland; William T. Trotter and Ruidong Wang, Georgia Institute of Technology, USA; Veit Wiechert, TU Berlin, Germany

4:15-4:40 Forbidden Structures in the Boolean Lattice
J. T. Johnston and Linyuan Lu, University of South Carolina, USA; *Kevin Milans*, West Virginia University, USA

4:45-5:10 Some Recent Results about Cross Intersecting Families
Norihide Tokushige, Ryukoku University, Japan

5:15-5:40 Symmetric Chain Decompositions of Quotients of Products
Dwight Duffus, Emory University, USA; Kyle Thayer, RealGo, Inc., USA

SIAG/DM Business Meeting

5:50 PM-6:50 PM

Room:Greenway C-H

Complimentary beer and wine will be served.

Wednesday, June 18

Registration

8:15 AM-3:45 PM

Room:Greenway Promenade

IP5

Approximation Algorithms Via Matrix Covers

8:45 AM-9:30 AM

Room:Greenway C-H

Chair: Bojan Mohar, Simon Fraser University, Canada

I will describe a general technique for obtaining approximate solutions of hard quadratic optimization problems using economical covers of high dimensional sets by small cubes. The analysis of the method leads to intriguing algorithmic, combinatorial, geometric, extremal and probabilistic questions. Based on joint papers with Troy Lee, Adi Shraibman and Santosh Vempala.

Noga Alon
Tel Aviv University, Israel

Coffee Break

9:30 AM-10:00 AM

Room:Greenway Promenade

Wednesday, June 18

MS26

Probabilistic and Extremal Combinatorics - Part I of II

10:00 AM-12:30 PM

Room:Greenway C-H

For Part 2 see MS33

Randomness often manifests itself in the construction of a combinatorial system or algorithm, as in the case of a so-called random graph. Intriguingly, it may also be artificially introduced as a proof technique to analyze purely deterministic systems, an approach pioneered and popularized by Paul Erdos. There is a rich interplay between probabilistic methods and extremal combinatorics, and this minisymposium will feature recent results from both areas.

Organizer: Thomas Bohman
Carnegie Mellon University, USA

Organizer: Po-Shen Loh
Carnegie Mellon University, USA

10:00-10:25 The Random Greedy Algorithm for Independent Sets in Hypergraphs
Patrick Bennett, University of Toronto, Canada; Thomas Bohman, Carnegie Mellon University, USA

10:30-10:55 Juggling Card Sequences
Ron Graham, University of California, San Diego, USA

11:00-11:25 Extremal Graphs for Connectedness
Penny Haxell, University of Waterloo, Canada; Lothar Narins and Tibor Szabo, Freie Universitaet Berlin, Germany

11:30-11:55 Hamiltonian Increasing Paths in Random Edge Orderings
Mikhail Lavrov and Po-Shen Loh, Carnegie Mellon University, USA

12:00-12:25 Extremal Problems on Diameter 2-critical Graphs
Po-Shen Loh and *Jie Ma*, Carnegie Mellon University, USA

Wednesday, June 18

MS27

Graph Structure - Part II of II

10:00 AM-12:30 PM

Room:Greenway A

For Part 1 see MS20

Structural graph theory seeks to characterize graph properties by classifying all obstructions to the properties. The methodology has produced numerous results in the study of graph minors and other containment relations as well as graph algorithms, graph coloring, and problems on paths and cycles.

Organizer: Paul Wollan
University of Rome La Sapienza, Italy

10:00-10:25 Treewidth-destroying Partitions of Graphs
Zdenek Dvorak, Charles University, Czech Republic

10:30-10:55 Inequivalent Representations of Highly Connected Matroids
Tony Huynh, University of Rome La Sapienza, Italy; Jim Geelen, University of Waterloo, Canada; Bert Gerards, CWI, Amsterdam, Netherlands; Stefan van Zwam, Princeton University, USA

11:00-11:25 Non-planar Extensions of Subdivisions of Planar Graphs
Sergey Norin, McGill University, Canada; Robin Thomas, Georgia Institute of Technology, USA

11:30-11:55 Spanning Trees with Vertices having Large Degrees
Kenta Ozeki, National Institute of Informatics, Japan; Yoshimi Egawa, Tokyo University of Science, Japan

12:00-12:25 Well-quasi-ordering Graphs by the Topological Minor Relation
Chun-hung Liu and Robin Thomas, Georgia Institute of Technology, USA

Wednesday, June 18

MS28

Hardness of Approximation

10:00 AM-12:30 PM

Room:Greenway B

It is known, since early 1990s, that for many NP-hard problems, it is computationally hard (infeasible) to find even approximately optimal solutions. For some problems such as 3-SAT and CLIQUE, tight hardness results are known, i.e. results that match the performance of the best known approximation algorithm. For most problems however, VERTEX COVER and MAX-CUT being prominent examples, tight results are not known and their pursuit has led to much research, including new connections between computer science and mathematics. The mini-symposium will present a general overview of the area as well as some recent results.

Organizer: Subhash Khot
New York University, USA

Organizer: Prasad Raghavendra
University of California, Berkeley, USA

10:00-10:25 Introduction to Hardness of Approximation
Subhash Khot, New York University, USA

10:30-10:55 Analytical Approach to Parallel Repetition
Irit Dinur, Weizmann Institute of Science, Israel; *David Steurer*, Cornell University, USA

11:00-11:25 Toward PCPs with Minimal Error
Dana Moshkovitz, Massachusetts Institute of Technology, USA

11:30-11:55 Unique Games Conjecture and Small Set Expansion
Prasad Raghavendra, University of California, Berkeley, USA

12:00-12:25 A Characterization of Strong Approximation Resistance
Madhur Tulsiani, Toyota Technological Institute at Chicago, USA

Wednesday, June 18

MS29

Spectral Graph Theory - Part II of II

10:00 AM-12:30 PM

Room:Greenway I

For Part 1 see MS11

Spectral graph theory studies structural properties of graphs by the use of eigenvalues of various associated matrices. In this minisymposium, we focus on applications of spectral analysis to wider topics in graph theory, as well as behavior of the spectrum of a graph under various perturbations and operations.

Organizer: Mary Radcliffe
University of Washington, USA

Organizer: Stephen J. Young
University of Louisville, USA

10:00-10:25 Nonlinear Eigenvalues in Random Regular Graphs
Mary Radcliffe, University of Washington, USA

10:30-10:55 Eigenvalue Stability under Hypermatrix Perturbation and Random Hypergraphs
Joshua Cooper, University of South Carolina, USA

11:00-11:25 Connected Hypergraphs with Small Spectral Radius
Linyuan Lu, University of South Carolina, USA

11:30-11:55 Numerical Methods for Estimating the Minimum Rank and Zero Forcing Number of Large Graphs
Franklin Kenter, Rice University, USA

12:00-12:25 Minimum Rank, Maximum Nullity, and Zero Forcing Number
Leslie Hogben, Iowa State University, USA

Wednesday, June 18

MS30

Cycles and Paths in Graphs - Part II of II

10:00 AM-12:30 PM

Room:Greenway J

For Part 1 see MS16

Finding special cycles/paths has been a fundamental, yet difficult, problem in graph theory. This minisymposium focuses on the recent progresses in finding long cycles (including hamiltonian cycles), spectra of cycle lengths, and cycle structural of special graphs.

Organizer: Xingxing Yu
Georgia Institute of Technology, USA

Organizer: Guantao Chen
Georgia State University, USA

10:00-10:25 Hamiltonicity of 3-connected Planar Graphs with No $K_{2,5}$ Minor
Mark Ellingham and Emily Marshall, Vanderbilt University, USA; Kenta Ozeki, National Institute of Informatics, Japan; Shoichi Tsuchiya, Tokyo University of Science, Japan

10:30-10:55 Combining Degree and Connectivity Bounds for Graph Linkages
Florian Pfender, University of Colorado, Denver, USA

11:00-11:25 A Spanning Tree Homeomorphic to a Small Tree
Akira Saito and Kazuki Sano, Nihon University, Japan

11:30-11:55 Forbidden Pairs for the Existence of a Spanning Halin Subgraph
Ping Yang, Georgia State University, USA; Zdenek Ryjácek, University of West Bohemia, Pilsen, Czech Republic

12:00-12:25 2-Factors in Edge Chromatic Critical Graphs with Large Maximum Degree
Songling Shan and Guantao Chen, Georgia State University, USA

Wednesday, June 18

MS31

Polymer Models and Combinatorics - Part II of III

10:00 AM-12:30 PM

Room:Skyway A

For Part 1 see MS24
For Part 3 see MS41

The minisymposium will cover some recent results related to applications of discrete mathematics and combinatorics to biology, chemistry and physics. One focus will be on applications to polymer and biopolymer modelling but other related methods and models will be discussed.

Organizer: Christine Soteros
University of Saskatchewan, Canada

10:00-10:25 Counting Knotted 2-Spheres in Tubes in Z^4
Stuart Whittington, University of Toronto, Canada

10:30-10:55 Exact Solution of a Simple Adsorption Model of De-naturating DNA
Aleks Owczarek, University of Melbourne, Australia

11:00-11:25 Random Knots and Confinement Considerations
Mariel Vazquez, San Francisco State University, USA

11:30-11:55 The Shape of a Hopf Link
Andrew Rechnitzer, University of British Columbia, Canada

12:00-12:25 Modeling Polymer Adsorption at an Inhomogeneous Surface
Gary K. Iliev and Stuart Whittington, University of Toronto, Canada; Enzo Orlandini, University of Padova, Italy

Wednesday, June 18

MS32

Combinatorics of Maps

10:00 AM-12:30 PM

Room:Skyway B

Maps are graphs embedded in surfaces, considered up to homeomorphism. From a combinatorial standpoint, a map is given by a graph together with a cyclic ordering of its edges around the vertices. Maps are fundamental structures in many different branches of mathematics and physics. In particular there are close relations between maps and permutations (because maps can be used to encode factorizations of permutations), Schur functions and KP hierarchy of equation (via the characters of the symmetric group), random Gaussian matrices (via Feynman diagrams), and random surfaces (because maps are discretizations of surfaces).

Organizer: Olivier Bernardi
Brandeis University, USA

10:00-10:25 The KP Hierarchy and Generating Series for Maps
Sean Carrel, University of Waterloo, Canada

10:30-10:55 A Bijection for Rooted Maps on Non-orientable Surfaces
Maciej Dolega, Universite Paris 7-Denis Diderot, France

11:00-11:25 A Graphical Proof of a Generalization of Boccara's Theorem Concerning the Multiplication of Long Cycles
Amarpreet Rattan, University of London, United Kingdom

11:30-11:55 The Brownian Continuum Random Tree Is the Scaling Limit of Random Dissections
Nicolas Curien, CNRS, France; *Igor Kortchemski*, Ecole Normale Supérieure, France; Bénédicte Haas, Ceremade, France

12:00-12:25 Exploring Some Non-constructive Map Bijections
Michael A. La Croix, Massachusetts Institute of Technology, USA

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Wednesday, June 18

IP6

Interlacing Families and Kaddison-Singer

2:00 PM-2:45 PM

Room:Greenway C-H

Chair: Fan Chung, University of California, San Diego, USA

This talk will focus on the resolution of two conjectures that have been shown to be equivalent to open problems in a number of fields, most famously a problem due to Kadison and Singer concerning the foundations of mathematical physics. This will include introducing a new technique for establishing the existence of certain combinatorial objects that we call the "method of interlacing polynomials." The technique seems to be interesting in its own right (it was also the main tool for resolving the existence of Ramanujan graphs of arbitrary degree). This represents join work with Dan Spielman of Yale University and Nikhil Srivastava of Microsoft Research, India.

Adam Marcus
Yale University, USA

Coffee Break

2:45 PM-3:15 PM

Room:Greenway Promenade

Wednesday, June 18

MS33

Probabilistic and Extremal Combinatorics - Part II of II

3:15 PM-5:45 PM

Room:Greenway C-H

For Part 1 see MS26

Randomness often manifests itself in the construction of a combinatorial system or algorithm, as in the case of a so-called random graph. Intriguingly, it may also be artificially introduced as a proof technique to analyze purely deterministic systems, an approach pioneered and popularized by Paul Erdos. There is a rich interplay between probabilistic methods and extremal combinatorics, and this minisymposium will feature recent results from both areas.

Organizer: Thomas Bohman
Carnegie Mellon University, USA

Organizer: Po-Shen Loh
Carnegie Mellon University, USA

3:15-3:40 A Short Proof of Gowers' Lower Bound for the Regularity Lemma
Guy Moshkovitz, Tel Aviv University, Israel

3:45-4:10 Turán Function for the Generalized Triangle
Sergey Norin and Liana Yepremyan, McGill University, Canada

4:15-4:40 On the Number of Real Roots of Kac Polynomials
Hoi Nguyen, Ohio State University, USA

4:45-5:10 Partitioning Random Hypergraphs
Will Perkins, Georgia Institute of Technology, USA

5:15-5:40 Randomly Coloring Random Graphs
Alan Frieze, Carnegie Mellon University, USA

Wednesday, June 18

MS34

Combinatorics and Statistical Mechanics - Part II of II

3:15 PM-5:45 PM

Room:Greenway A

For Part 1 see MS2

Organizer: Richard Kenyon
Brown University, USA

3:15-3:40 Maximum Independent Sets in Random d-regular Graphs
Jian Ding, University of Chicago, USA; Allan Sly, University of California, Berkeley, USA; *Nike Sun*, Stanford University, USA

3:45-4:10 Slow Mixing for the Hard--Core Model on Z^2
Antonio Blanca, University of California, Berkeley, USA; David J. Galvin, University of Notre Dame, USA; *Dana Randall* and Prasad Tetali, Georgia Institute of Technology, USA

4:15-4:40 The Structure of the Abelian Sandpile
Lionel Levine, Cornell University, USA; *Wesley Pegden*, Carnegie Mellon University, USA; Charles Smart, Massachusetts Institute of Technology, USA

4:45-5:10 Phase Transitions in the Laplacian Determinant
Richard Kenyon, Brown University, USA

5:15-5:40 Local Statistics of the Abelian Sandpile Model
David B. Wilson, Microsoft Research, USA

Wednesday, June 18

MS35

Graph Structure and Algorithms

3:15 PM-5:45 PM

Room:Greenway B

Often graphs arising in applications have special structure, which can sometimes be exploited to design efficient algorithms for problems that are hard in general. In this minisymposium we look at special structure such as excluding induced paths and cycles, and when this allows for efficient algorithms for graph coloring and related problems.

Organizer: Kathie Cameron
Wilfrid Laurier University, Canada

3:15-3:40 Recognizing and Colouring Claw-Free Graphs Without Even Holes
Kathie Cameron, Wilfrid Laurier University, Canada; Steven Chaplick, Technische Universität Berlin, Germany; Chinh Hoang, Wilfrid Laurier University, Canada

3:45-4:10 Coloring Graphs Without Induced Paths and Cycles
Shenwei Huang and Pavol Hell, Simon Fraser University, Canada

4:15-4:40 Digraph Analogues of Interval Graphs and of Trivially Perfect Graphs
Pavol Hell, Simon Fraser University, Canada

4:45-5:10 On the Contour of Chordal Bipartite Graphs
Danilo Artigas, Universidade Federal Fluminense, Brazil; *R. Sritharan*, University of Dayton, USA

5:15-5:40 Non-Planar Extensions of Planar Signed Graphs
Bertrand Guenin and *Katie Naismith*, University of Waterloo, Canada

Wednesday, June 18

CP4

Algebraic Methods

3:15 PM-5:15 PM

Room:Greenway I

Chair: Ron Gould, Emory University, USA

3:15-3:30 First Eigenvectors of Nonsingular Unicyclic 3-Colored Digraphs
Debajit Kalita, Tezpur University, India

3:35-3:50 Strong Double Graphs: Spectral Properties, Energy and Laplacian Energy
Shariefuddin Pirzada and Hilal Ganai, University of Kashmir, India

3:55-4:10 On the Matrix Sequence $\Gamma(A^m)_{\{m=1\}}^{\infty}$ for a Boolean Matrix A Whose Digraph Is Linearly Connected
Jihoon Choi and Suh-Ryung Kim, Seoul National University, Korea

4:15-4:30 A Combinatorial Characterization of Binary Positional Number Systems
Andrew Vince, University of Florida, USA

4:35-4:50 G-Ham Sandwich Theorems: Harmonic Analysis and Measure Partitions
Steven Simon, Wellesley College, USA

4:55-5:10 Forcing Sets in Self-Folding Origami
Thomas Hull, Western New England University, USA

Wednesday, June 18

CP5

Cycles

3:15 PM-5:35 PM

Room:Greenway J

Chair: Mark Ellingham, Vanderbilt University, USA

3:15-3:30 Cycle Decompositions with a Certain Degree of Symmetry
Tommaso Traetta, Universita degli Studi di Perugia, Italy

3:35-3:50 Loose Cycles in 3-Uniform Hypergraphs
Andrzej M. Czygrinow, Arizona State University, USA

3:55-4:10 Nonempty Intersection of Longest Paths in Series-Parallel Graphs
Carl Georg Heise and Julia Ehrenmueller, Hamburg University of Technology, Germany; Cristina Fernandes, University of Sao Paulo, Brazil

4:15-4:30 On 2-Factors with a Bounded Number of Odd Cycles
Jennifer Diemunsch, Michael Ferrara, Samantha Graffeo, and Timothy Morris, University of Colorado, Denver, USA

4:35-4:50 Hamiltonian Cycles in {1,4}-Leaper Graphs
Grady Bullington, *Linda Eroh*, and Steven J. Winters, University of Wisconsin, Oshkosh, USA

4:55-5:10 Cycle Extendability of Chordal Graphs and Tournaments
David E. Brown, LeRoy Beasley, and Deborah Arangno, Utah State University, USA

5:15-5:30 Near Perfect Matchings in k-uniform Hypergraphs
Jie Han, Georgia State University, USA

Wednesday, June 18

CP6

Geometric Representations

3:15 PM-5:15 PM

Room:Skyway A

Chair: Jan Kratochvil, Charles University, Czech Republic

3:15-3:30 Almost Isometric Drawings of Graphs
Jens Schreyer and Thomas Boehme, Technical University of Ilmenau, Germany

3:35-3:50 Weak Universality for 2-Dimensional Parallel Drawings
David Richter, Western Michigan University, USA

3:55-4:10 N-Flips in 4-Connected Eulerian Triangulations on the Sphere
Naoki Matsumoto, Yokohama National University, Japan

4:15-4:30 Analytical Properties of Horizontal Visibility Graphs Generated by the Feigenbaum Unversal Route to Chaos in Discrete Models
Tarini K. Dutta, Gauhati University, India

4:35-4:50 New Characterizations of Proper Interval Bigraphs
Ashok K. Das, University Of Calcutta, India

4:55-5:10 Excluded Vertex-minors for Graphs of Linear Rank-width at Most *k*
O-Joung Kwon, Sang-Il Oum, and Jisu Jeong, KAIST, Korea

Wednesday, June 18

CP7

Coloring

3:15 PM-5:15 PM

Room:Skyway B

Chair: Daniel Cranston, Virginia Commonwealth University, USA

3:15-3:30 A Distance-Two Coloring with Application to Wireless Sensor and Actor Networks
Wu-Hsiung Lin, Well Chiu, Yen-Cheng Chao, and Chiuyuan Chen, National Chiao Tung University, Taiwan

3:35-3:50 Chromatic-Choosability of the Power of Graphs
Seog-Jin Kim, Konkuk University, South Korea; Young Soo Kwon, Yeungnam University, Korea; Boram Park, National Institute for Mathematical Sciences, Korea

3:55-4:10 Steinberg's Conjecture, the Bordeaux Coloring Conjecture and Near-Coloring
Carl Yerger, Davidson College, USA; Kyle Yang, Stanford University, USA

4:15-4:30 Equitable Coloring of Graphs with Intermediate Maximum Degree
Ko-Wei Lih, Institute of Mathematics, Academia Sinica, Taipei, Taiwan; Bor-Liang Chen, National Taichung University of Science and Technology, Taiwan; Kuo-Ching Huang, Providence University, Taiwan

4:35-4:50 Coloring Planar Digraphs
Ararat Harutyunyan, University of Oxford, United Kingdom

4:55-5:10 Colorings with Fractional Defect
Wayne Goddard and Honghai Xu, Clemson University, USA

Dinner Break

5:45 PM-8:00 PM

Attendees on their own

Wednesday, June 18

SP1

2014 Dénes König Prize Lecture: The Number of $K_{s,t}$ -Free Graphs

8:00 PM-8:45 PM

Room:Greenway C-H

Chair: Douglas B. West, Zhejiang Normal University, China and University of Illinois, USA

The problem of enumerating H-free graphs with a given number of vertices has been studied for almost forty years. As a result, a great deal is known about this problem. When H is not bipartite, we have not only good estimates of the number of H-free graphs, but also fairly precise structural characterisation of a typical such graph. On the contrary, not much is known in case when H is bipartite. A few years ago, we proved asymptotically optimal upper bounds on the number of graphs not containing a fixed complete bipartite graph $K_{s,t}$. This was the first infinite family of bipartite graphs for which such a bound was established. Since then, the method developed in our proof has found several interesting applications to a large class of related problems.

Wojciech Samotij
Tel Aviv University, Israel;

Jozsef Balogh
University of Illinois, USA

Thursday, June 19

Registration

7:45 AM-3:15 PM

Room:Greenway Promenade

IP7

Hamilton Decompositions of Graphs and Digraphs

8:15 AM-9:00 AM

Room:Greenway C-H

Chair: Penny Haxell, University of Waterloo, Canada

In this talk I will survey recent results on Hamilton decompositions, i.e. decompositions of the edge-set of a graph or digraph into edge-disjoint Hamilton cycles. One example is a conjecture of Kelly from 1968, which states that every regular tournament has a Hamilton decomposition. We prove this conjecture for large tournaments. In fact, we prove a far more general result, which has further applications. Another example is the Hamilton decomposition conjecture, which was posed by Nash-Williams in 1970. It states that every regular graph on n vertices with minimum degree at least n/2 has a Hamilton decomposition (joint work with Bela Csaba, Allan Lo, Deryk Osthus and Andrew Treglown).

Daniela Kuhn
University of Birmingham, United Kingdom

Coffee Break

9:00 AM-9:30 AM

Room:Greenway Promenade

Thursday, June 19

MS36

Ramsey Theory - Part II of II

9:30 AM-12:00 PM

Room:Greenway C-H

For Part 1 see MS8

There has recently been many exciting developments in Ramsey theory. This minisymposium will cover some of these important recent advances in the area, including graph Ramsey theory, Ramsey numbers, and Ramsey theorems in random structures.

Organizer: Jacob Fox
Massachusetts Institute of Technology, USA

Organizer: Andrey Grinshpun
Massachusetts Institute of Technology, USA

9:30-9:55 Monochromatic Bounded Degree Subgraph Partitions

Andrey Grinshpun, Massachusetts Institute of Technology, USA; Gabor Sarkozy, Worcester Polytechnic Institute, USA

10:00-10:25 Hypergraph Ramsey Numbers

Jacques Verstraete, University of California, San Diego, USA

10:30-10:55 Multipass Random Coloring of Simple Uniform Hypergraphs

Jakub Kozik, Jagiellonian University, Poland; Dmitry Shabanov, Lomonosov Moscow State University, Russia

11:00-11:25 Shelah's Grid Ramsey Problem

Jacob Fox, Massachusetts Institute of Technology, USA; David Conlon, University of Oxford, United Kingdom; Choongbum Lee, Massachusetts Institute of Technology, USA; Benny Sudakov, ETH Zürich, Switzerland

11:30-11:55 Restricted Ramsey-Type Theorems

Vojtech Rödl and *Hiep Han*, Emory University, USA

Thursday, June 19

MS37

Graph Colouring - Part II of II

9:30 AM-12:00 PM

Room:Greenway A

For Part 1 see MS9

Graph colorings and other restricted partitions play a central role in discrete mathematics. They also have numerous practical applications. New theoretical and algorithmic results on graph colorings will be presented in this minisymposium.

Organizer: Zdenek Dvorak
Charles University, Czech Republic

9:30-9:55 Painting Squares in Δ^2-1 Shades
Daniel Cranston, Virginia Commonwealth University, USA; Landon Rabern, LBD Software Solutions, USA

10:00-10:25 Choosability of Graphs With Bounded Order
Jonathan A. Noel, University of Oxford, United Kingdom

10:30-10:55 List Coloring the Square of Sparse Graphs
Marthe Bonamy, Benjamin Léveque, and Alexandre Pinlou, Université Montpellier II, France

11:00-11:25 The Potential Technique in Graph Coloring
Luke Postle, University of Waterloo, Canada

11:30-11:55 Online and Size anti-Ramsey Numbers
Maria Axenovich and Torsten Ueckerdt, Karlsruhe Institute of Technology, Germany; Kolja Knauer, Université Montpellier II, France; Judith Stumpp, Karlsruhe Institute of Technology, Germany

Thursday, June 19

MS38

Combinatorial Design Theory - Part II of II

9:30 AM-12:00 PM

Room:Greenway B

For Part 1 see MS21

In the past fifty years, combinatorial design theory has developed into a vibrant independent branch of combinatorics, with its own aims, methods and problems. It has found substantial applications in other branches of combinatorics, in graph theory, coding theory and cryptography, theoretical computer science, statistics, and algebra, among others. The talks in this Minisymposium will reflect the wide variety of problems and challenges of modern design theory, by including topics in resolvable designs, latin squares, one-factorizations, triple systems, large sets, and embeddings.

Organizer: Alexander Rosa
McMaster University, Canada

9:30-9:55 On a Problem of Mariusz Meszka
Alexander Rosa, McMaster University, Canada

10:00-10:25 Switchings for 1-Factorizations
Ian Wanless, Monash University, Australia

10:30-10:55 Biembeddings and Graph Decompositions
Ben Smith, University of Queensland, Australia

11:00-11:25 Triple Systems, Gray Codes and Snarks
David A. Pike, Memorial University, Newfoundland, Canada

11:30-11:55 Approaching the Minimum Number of Clues Sudoku Problem Via the Polynomial Method
John Schmitt, Middlebury College, USA

Thursday, June 19

MS39

Selected Contributed Talks - Part II of II

9:30 AM-11:30 PM

Room:Greenway I

For Part 1 see MS4

This minisymposium consists of five contributed talks that were selected by the Organizing Committee.

Organizer: Gyula Katona
Hungarian Academy of Sciences, Hungary

9:30-9:55 On the Number of B_h-Sets
Sang June Lee, KAIST, Korea; Domingos Dellamonica JR., Emory University, USA; Yoshiharu Kohayakawa, Universidade de Sao Paulo, Brazil; Vojtech RODL, Emory University, USA; Wojciech Samotij, Tel Aviv University, Israel

10:00-10:25 On Erdös' Conjecture on the Number of Edges in 5-Cycles
Zeinab Maleki, Isfahan University of Technology, Iran; Zoltan Furedi, University of Illinois at Urbana-Champaign, USA

10:30-10:55 Large Subgraphs Without Short Cycles
Guillem Perarnau, McGill University, Canada

11:00-11:25 Asymptotic Distribution of the Numbers of Vertices and Arcs in the Giant Strong Component in Sparse Random Digraphs
Daniel J. Poole and Boris Pittel, The Ohio State University, USA

Thursday, June 19

MS40

Degree Sequences of Graphs and Hypergraphs

9:30 AM-12:00 PM

Room:Greenway J

Degree sequence are one of the simplest graph invariants, yet they encompasses a tremendous amount of information about their realizations. While the degree sequences of graphs are widely studied in a variety of contexts, the degree sequences of k-uniform hypergraphs for $k \geq 3$ have received considerably less attention and pose many new challenges. For instance, while numerous characterizations of graphic sequences exist, for fixed $k \geq 3$ no efficient characterization of k-graphic sequences is known. This minisymposium will present several new results on the degree sequences of graphs and hypergraphs, and will discuss some exciting new research directions.

Organizer: Michael Ferrara
University of Colorado, Denver, USA

9:30-9:55 Degree Sequences of Uniform Hypergraphs: Results and Open Problems
Michael Ferrara, University of Colorado, Denver, USA; Behrens Sarah, University of Nebraska, Lincoln, USA; Catherine Erbes, University of Colorado, Denver, USA; Stephen Hartke, University of Nebraska, Lincoln, USA; Benjamin Reiniger and Hannah Spinoza, University of Illinois at Urbana-Champaign, USA; Charles Tomlinson, University of Nebraska, Lincoln, USA

10:00-10:25 Degree Sequences and Forced Adjacency Relationships
Michael D. Barrus, Brigham Young University, USA

10:30-10:55 The Asymptotic Behavior of the Potential Function
Paul Wenger, Rochester Institute of Technology, USA; Michael Ferrara, University of Colorado, Denver, USA; Timothy LeSaulnier, National Security Agency, USA; Catherine Erbes, University of Colorado, Denver, USA; Ryan R. Martin, Iowa State University, USA

continued in next column

11:00-11:25 Stability of the Potential Function
Catherine Erbes and Michael Ferrara, University of Colorado, Denver, USA; Ryan R. Martin, Iowa State University, USA; Paul Wenger, Rochester Institute of Technology, USA

11:30-11:55 Minimal Forbidden Sets for Degree Sequence Characterizations
Stephen Hartke, University of Nebraska, Lincoln, USA; Michael D. Barrus, Brigham Young University, USA

Thursday, June 19

MS41

Polymer Models and Combinatorics - Part III of III

9:30 AM-12:00 PM

Room:Skyway A

For Part 2 see MS31

The minisymposium will cover some recent results related to applications of discrete mathematics and combinatorics to biology, chemistry and physics. One focus will be on applications to polymer and biopolymer modelling but other related methods and models will be discussed.

Organizer: Christine Soteros
University of Saskatchewan, Canada

9:30-9:55 Inhomogeneous Percolation with a Defect Plane
Neal Madras, York University, Canada; Gary K. Iliev, University of Toronto, Canada; EJ Janse van Rensburg, York University, Canada

10:00-10:25 Assorted Topics in the Monte Carlo Simulation of Polymers
Nathan Clisby, University of Melbourne, Australia

10:30-10:55 Mitochondrial DNA Organization in Trypanosomatid Parasite
Javier Arsuaga, San Francisco State University, USA

11:00-11:25 Enumerating Knots in Lattice Tube Models of Polymers
Christine Soteros, University of Saskatchewan, Canada

11:30-12:00 Subknots in Closed Chains
Eric Rawdon, University of St. Thomas, USA

Thursday, June 19

MS42

Combinatorics of Hyperbolic and Real Stable Polynomials

9:30 AM-12:00 PM

Room:Skyway B

Hyperbolic and real stable polynomials are multivariate generalizations of the class of univariate polynomials having all real roots. They are remarkable in that they arise naturally in a variety of combinatorial, probabilistic, and geometric situations, and are at the same time well-behaved and quite well-understood analytically and algebraically. This leads to a fruitful interplay in which hyperbolicity and stability are used to deduce combinatorial results and vice versa. The minisymposium covers some significant recent successes of this methodology.

Organizer: Nikhil Srivastava
Microsoft Research, India

9:30-9:55 Introduction to Hyperbolic and Real Stable Polynomials
Nikhil Srivastava, Microsoft Research, India

10:00-10:25 Stable Multivariate Polynomials and the Lower Bounds: (old)Results and (new)Conjectures
Leonid Gurvits, City College of CUNY, USA

10:30-10:55 Stable Multivariate Eulerian Polynomials
Mirko Visontai, Google, Inc., USA

11:00-11:25 Hyperbolic Polynomials, Interlacers, and Sums of Squares
Cynthia Vinzant, University of Michigan, USA

11:30-11:55 Title Not Available at Time of Publication
Robin Pemantle, University of Pennsylvania, USA

Lunch Break

12:00 PM-1:30 PM

Attendees on their own

Thursday, June 19

IP8

The Complexity of Graph and Hypergraph Expansion Problems

1:30 PM-2:15 PM

Room:Greenway C-H

Chair: Alan Frieze, Carnegie Mellon University, USA

The expansion of a graph is a fundamental parameter with many connections in mathematics and applications in computer science. Two basic variants of expansion are edge-expansion (minimum ratio of the number of edges leaving a subset of vertices to the total number of edge incident to the subset) and vertex expansion (minimum ratio of number of vertices adjacent to a subset to the size of the subset). Both are NP-hard to compute exactly and the current best polynomial-time algorithms provide either an $O(\sqrt{\log n^{OPT}})$ solution these problems, or, for edge-expansion, an $O(\sqrt{OPT})$solution. The latter is via Cheeger's inequality relating edge expansion to the second smallest eigenvalue of the graph Laplacian, and provides an efficient method to check if a graph is an edge expander (i.e., has edge expansion is at least some constant). In this talk, we survey recent developments on the following lines:

1. What is the analog of expansion for partitioning a graph into multiple parts (more than 2), and how does Cheeger's inequality generalize?

2. Is there a Cheeger-type inequality for vertex expansion? How to efficiently verify whether a graph is a vertex expander?

3. Do there exist algorithms with better performance?

4. How do these parameters, inequalities and algorithms extend to hypergraphs?

Santosh Vempala
Georgia Institute of Technology, USA

Coffee Break

2:15 PM-2:45 PM

Room:Greenway Promenade

Thursday, June 19

MS43

Graph Polynomials: Towards a General Theory - Part II of II

2:45 PM-5:15 PM

Room:Greenway C-H

For Part 1 see MS12

The last ten years have seen increased activity in the study of graph invariants in the form of partition functions, generalized chromatic polynomials and subgraph-counting generating functions. A general theory is gradually emerging that brings together the seemingly disjunct objects, techniques and concepts that have hitherto characterized the area of polynomial graph invariants, now over a century old since Birkhoff's introduction of the chromatic polynomial in 1912. The purpose of this minisymposium is to provide a forum for different directions of contemporary research on graph polynomials with a view to further developing this unifying approach.

Organizer: Johann A. Makowsky
Technion - Israel Institute of Technology, Israel

Organizer: Andrew J. Goodall
Charles University, Czech Republic

Organizer: Joanna Ellis-Monaghan
Saint Michael's College, USA

2:45-3:10 Graph Polynomials from Graph Homomorphisms
Delia Garijo, University of Sevilla, Spain; *Andrew J. Goodall* and Jaroslav Nesetril, Charles University, Czech Republic

3:15-3:40 On the Location of the Roots of Graph Polynomials
Johann A. Makowsky, Technion - Israel Institute of Technology, Israel; *Elena Ravve*, ORT Braude College, Israel; Nicolas Blanchard, ENS, France

3:45-4:10 On the Largest Real Root of the Independence Polynomials of Trees

continued on next page

Mohammad Reza Oboudi, University of Isfahan, Iran

4:15-4:40 On the Complexity of Various Ising Polynomials
Tomer Kotek, Vienna University of Technology, Austria

4:45-5:10 The Complexity of Counting Edge Colorings and a Dichotomy for Some Higher Domain Holant Problems
Jin-Yi Cai, Heng Guo, and *Tyson Williams*, University of Wisconsin, Madison, USA

Thursday, June 19

MS44

Points and Lines in Metric Spaces and Hypergraphs

2:45 PM-5:15 PM

Room:Greenway A

Every noncollinear set of n points in the plane determines at least n distinct lines. Line uv in the plane consists of all points p such that dist(p, u)+dist(u, v)=dist(p, v) or dist(u, p)+dist(p, v)=dist(u, v) or dist(u, v)+dist(v, p)=dist(u, p); with this definition of of line uv in an arbitrary metric space (V, dist), Chen and Chvatal conjectured in 2006 that every metric space on n points, where n is at least 2, has at least n distinct lines or a line that consists of all n points. The minisymposium will survey results supporting this conjecture.

Organizer: Vasek Chvatal
Concordia University, Canada

Organizer: Xiaomin Chen
Shanghai Jianshi LTD, China

2:45-3:10 Lines in Metric Spaces and Hypergraphs: A Survey
Xiaomin Chen, Shanghai Jianshi LTD, China

3:15-3:40 Points, Lines, and the Manhattan Metric
Ida Kantor, Charles University, Czech Republic; Balazs Patkos, Renyi Institute, Hungary

3:45-4:10 A De Bruijn-Erdos Theorem for Distance-hereditary Graphs
Rohan Kapadia and Pierre Aboulker, Concordia University, Canada

4:15-4:40 Lines in Metric Spaces Induced by General Graphs
Cathryn Supko, Concordia University, Canada

4:45-5:10 A New Generalisation of a de Bruijn Erdos Theorem
Pierre Aboulker, Concordia University, Canada; Stephan Thomassé, ENS Lyon, France

Thursday, June 19

MS45

Pursuit Games on Graphs - Part II of II

2:45 PM-5:15 PM

Room:Greenway I

For Part 1 see MS15

Pursuit games on graphs originated in the early eighties with the introduction of the Game of Cops and Robbers. Since then, researchers have investigated a variety of pursuit games focussed on capture, containment or control of an adversary. The last decade has witnessed a wealth of pursuit game results in structural, probabilistic and algorithmic graph theory. This minisymposium will bring together leading researchers in the field to discuss state-of-the-art work on the subject.

Organizer: Andrew J. Beveridge
Macalester College, USA

2:45-3:10 The Computational Complexity of Cops and Robbers
Bill Kinnersley, Ryerson University, Canada

3:15-3:40 The Eternal Dominating Set Problem on Grids
Margaret-Ellen Messinger, Mount Allison University, Canada

3:45-4:10 Lazy Cops and Robbers
Deepak Bal, Anthony Bonato, Bill Kinnersley, and Pawel Pralat, Ryerson University, Canada

4:15-4:40 Cop Versus Gambler
Natasha Komarov, Carnegie Mellon University, USA

4:45-5:10 Line-of-Sight Pursuit in Sweepable Polygons
Andrew J. Beveridge, Macalester College, USA

Thursday, June 19

MS46

Graph Theory

2:45 PM-5:15 PM

Room:Greenway J

This minisymposium contains talks on various problems in graph theory.

Organizer: Alexandr Kostochka
University of Illinois at Urbana-Champaign, USA

2:45-3:10 Kekulean Benzenoids
Elizabeth Hartung, Massachusetts College of Liberal Arts, USA; Jack Graver, Syracuse University, USA

3:15-3:40 On r-dynamic Coloring of Graphs
Sogol Jahanbekam, University of Colorado, Denver, USA; Jaehoon Kim, University of Illinois, USA; Suil O, Georgia State University, USA; *Douglas B. West*, Zhejiang Normal University, China and University of Illinois, USA

3:45-4:10 Split Graphs and Nordhaus-Gaddum Graphs
Ann N. Trenk, Wellesley College, USA; Karen Collins, Wesleyan University, USA

4:15-4:40 Counting Split Graphs and Nordhaus-Gaddum Graphs
Karen Collins, Wesleyan University, USA; Ann N. Trenk, Wellesley College, USA

4:45-5:10 Dichromatic Number and Fractional Chromatic Number and
Hehui Wu and Bojan Mohar, Simon Fraser University, Canada

Thursday, June 19

CP8

Graphs

2:45 PM-4:45 PM

Room:Greenway B

Chair: Ralph Faudree, University of Memphis, USA

2:45-3:00 Some Problems on Paths and Cycles
Chunhui Lai, Minnan Normal University, China

3:05-3:20 Signed Edge Domination Numbers of Complete Tripartite Graphs
Abdollah Khodkar, University of West Georgia, USA; *Arezoo Nazi Ghameshlou*, University of Tehran, Iran

3:25-3:40 On the Centralizing Number of Graphs
Sarah L. Behrens and Stephen Hartke, University of Nebraska, Lincoln, USA

3:45-4:00 A Result on Clique Convergence for Join of Graphs
V. V. P. R. V. B. Suresh Dara and S. M. Hegde, National Institute of Technology Karnataka , Surathkal, India

4:05-4:20 Modified Regular Line Digraphs for Optimal Connectivity and Small Diameters
Prashant D. Joshi, Intel Corporation, USA; Said Hamdioui, Delft University of Technology, Netherlands

4:25-4:40 Deciding the Bell Number for Hereditary Graph Classes
Jan Foniok, Aistis Atminas, Andrew Collins, and Vadim Lozin, University of Warwick, United Kingdom

Thursday, June 19

CP9

Optimization

2:45 PM-4:45 PM

Room:Skyway A

Chair: Csaha D. Toth, California State University, Northridge, USA

2:45-3:00 On the Stable Matchings That Can Be Reached When the Agents Go Marching in One by One
Christine T. Cheng, University of Wisconsin, Milwaukee, USA

3:05-3:20 The Minimum Number of Hubs Needed in Networks
Easton Li Xu and Guangyue Han, University of Hong Kong, Hong Kong

3:25-3:40 Discrete Tropical Optimization Problems
Nikolai Krivulin, St Petersburg State University, Russia

3:45-4:00 Characterization of Convex Sets Which Are Semidefinite Representable at Infinity
Anusuya Ghosh and Vishnu Narayanan, Indian Institute of Technology-Bombay, India

4:05-4:20 Deriving Compact Extended Formulations via LP-based Separation Techniques
Giuseppe Lancia and *Paolo Serafini*, University of Udine, Italy

4:25-4:40 Finding the Minimum Value of a Vector Function Using Lipschitz Condition
Ibraheem Alolyan, King Saud University, Saudia Arabia

Thursday, June 19

CP10

Combinatorics

2:45 PM-5:05 PM

Room:Skyway B

Chair: Marni Mishna, Simon Fraser University, Canada

2:45-3:00 Pattern Occurrence Statistics and Applications to the Ramsey Theory of Unavoidable Patterns

Francine Blanchet-Sadri, University of North Carolina, USA; *Jim Tao*, Princeton University, USA

3:05-3:20 Minimal Partial Languages and Automata

Francine Blanchet-Sadri, University of North Carolina, USA; *Kira Goldner*, Oberlin College, USA; Aidan Shackleton, Swarthmore College, USA

3:25-3:40 On Minimal Partial Words with Subword Complexity 2n

Francine Blanchet-Sadri, University of North Carolina, USA; Mark Heimann, University of Washington in St. Louis, USA; Andrew Lohr and Katie McKeon, Rutgers University, USA

3:45-4:00 Tight Bounds on Number of Primitively-Rooted Squares in Partial Words

Francine Blanchet-Sadri, University of North Carolina, USA; *Jordan Nikkel*, Vanderbilt University, USA; James Quigley, University of Illinois at Urbana-Champaign, USA; Xufan Zhang, Princeton University, USA

4:05-4:20 A Variation of the Instant Insanity Puzzle

Steven J. Winters, University of Wisconsin, Oshkosh, USA

4:25-4:40 Keeping Avoider's Graph Almost Acyclic

Julia Ehrenmueller, Hamburg University of Technology, Germany; Dennis Clemens, Freie Universität Berlin, Germany; Yury Person, University of Frankfurt, Germany; Tuan Tran, Freie Universität Berlin, Germany

4:45-5:00 The Relationships Between the Bernaulli Numbers B_{2n} & A_n and the Euler Numbers E_{2n} & B_n

Mohammed R. Karim, Alabama A&M University, USA

Notes

Abstracts

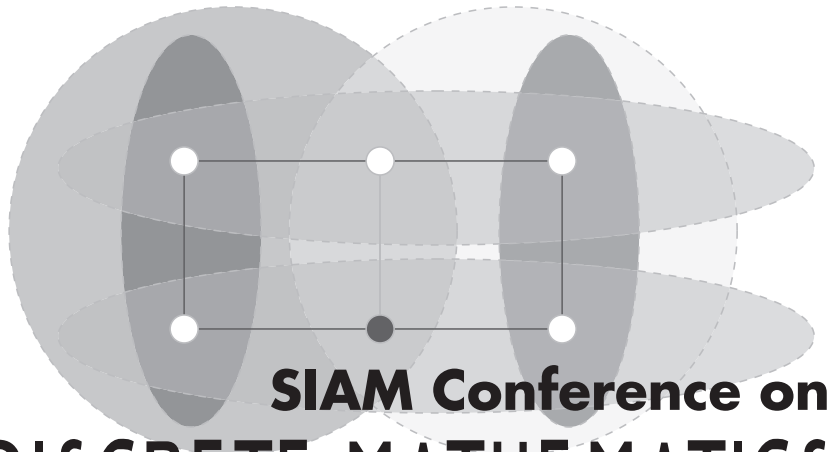


Figure courtesy Victor Chepoi, Hans-Juergen Bandelt, David Eppstein from SIDMA 24-4

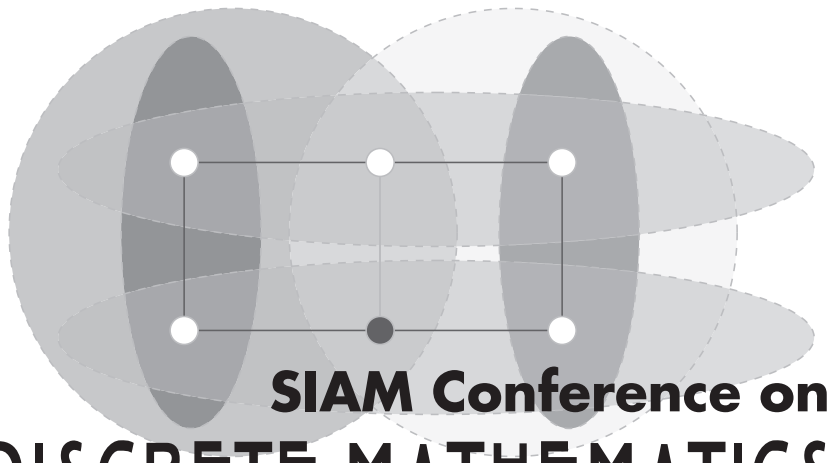
SIAM Conference on
DISCRETE MATHEMATICS

June 16-19, 2014
Hyatt Regency Minneapolis
Minneapolis, Minnesota, USA

Abstracts are printed as submitted.

Notes

Organizer and Speaker Index



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SIAM Conference on

DISCRETE MATHEMATICS

June 16-19, 2014

Hyatt Regency Minneapolis

Minneapolis, Minnesota, USA

Italicized names indicate session organizers.

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Italicized names indicate session organizers.

Notes

DM14 Budget

Conference Budget
SIAM Conference on Discrete Mathematics
June 16-19, 2014
Minneapolis, MN

Expected Paid Attendance		340	
Revenue			
Registration Income			$100,175
	Total		$100,175
Expenses			
Printing			$2,500
Organizing Committee			$3,800
Invited Speakers			$10,500
Food and Beverage			$24,000
AV Equipment and Telecommunication			$13,200
Advertising			$4,400
Conference Labor (including benefits)			$40,504
Other (supplies, staff travel, freight, misc.)			$7,400
Administrative			$10,195
Accounting/Distribution & Shipping			$5,006
Information Systems			$8,952
Customer Service			$3,316
Marketing			$5,148
Office Space (Building)			$2,811
Other SIAM Services			$3,187
	Total		$144,919
Net Conference Expense			-$44,744
Support Provided by SIAM			$44,744
			$0
Estimated Support for Travel Awards not included above:			
Early Career and Students		27	$18,150

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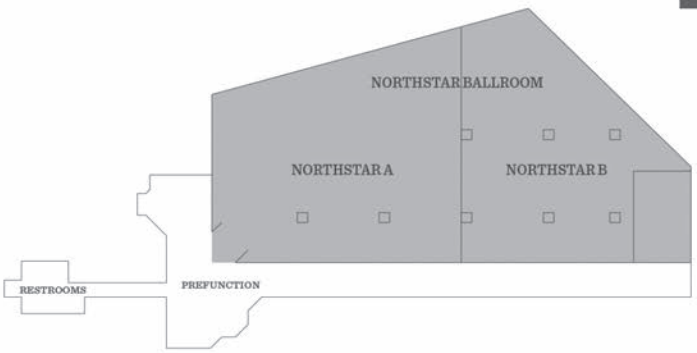

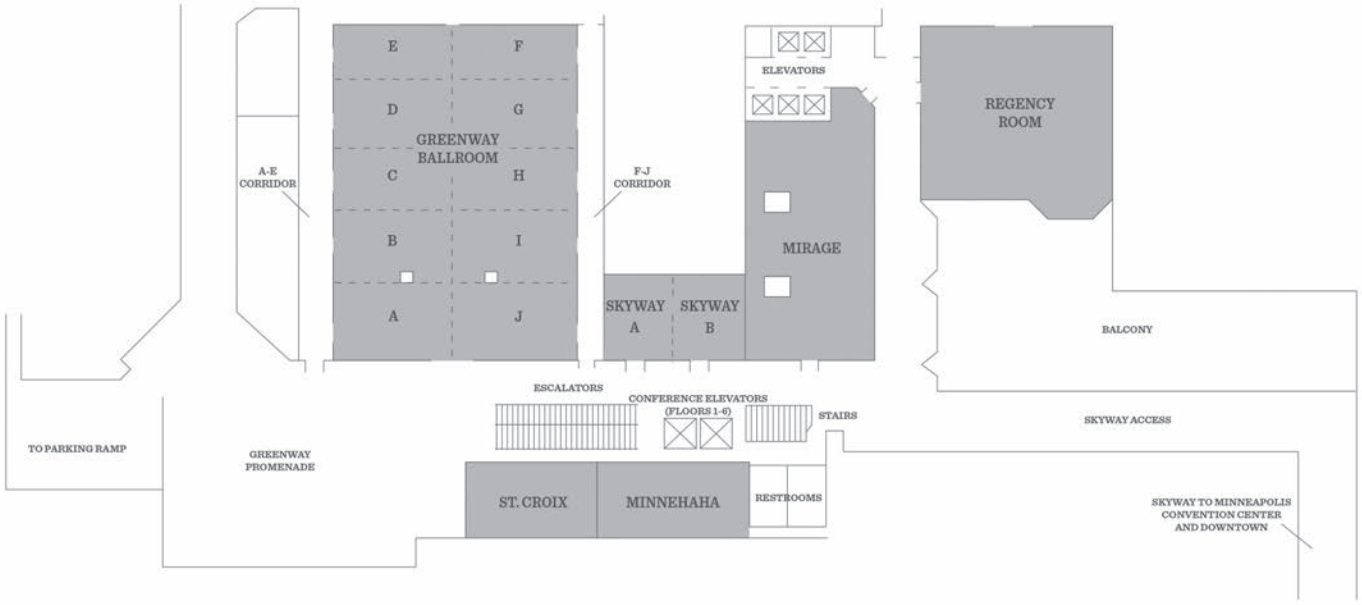

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