

# SoCG2014 Program

## Session 1a (Sunday, 9:30 - 11:10)

### **Counting and Enumerating Crossing-free Geometric Graphs**

Manuel Wettstein

### **Light Spanners for Snowflake Metrics**

Lee-Ad Gottlieb and Shay Solomon

### **There are Plane Spanners of Maximum Degree 4**

Nicolas Bonichon, Iyad Kanj, Ljubomir Perković, and Ge Xia

### **New and Improved Spanning Ratios for Yao Graphs**

Luis Barba, Prosenjit Bose, Mirela Damian, Rolf Fagerberg, Wah Loon Keng, Joseph O'Rourke, André van Renssen, Perouz Taslakian, Sander Verdonschot, and Ge Xia

## Session 1b (Sunday, 9:30 - 11:10)

### **On Constant Factors in Comparison-Based Geometric Algorithms and Data Structures**

Timothy M. Chan and Patrick Lee

### **Progressive Geometric Algorithms**

Sander Alewijnse, Timur Bagautdinov, Mark De Berg, Quirijn Bouts, Alex Ten Brink, Kevin Buchin, and Michel Westenberg

### **On the Impossibility of Dimension Reduction for Doubling Subsets of $\ell_p$**

Yair Bartal, Lee-Ad Gottlieb, and Ofer Neiman

### **The Limited Blessing of Low Dimensionality:**

**when  $1 - 1/d$  is the Best Possible Exponent for  $d$ -dimensional Geometric Problems**

Dániel Marx and Anastasios Sidiropoulos

## Session 2 (Sunday, 11:30 - 12:55)

### **Design of 3D printed mathematical art (invited talk)**

Henry Segerman

### **Embeddability in the 3-sphere is Decidable (best paper award)**

Jiří Matoušek, Eric Sedgwick, Martin Tancer, and Uli Wagner

## Video Session (Sunday, 14:30 - 16:00)

### **The Connect-The-Dots Family of Puzzles: The Video**

Mira Kaiser, Tim van Kapel, Gerwin Klappe, Marc van Kreveld, Maarten Löffler, and Frank Staals

### **LiveCG: an Interactive Visualization Environment for Computational Geometry**

Sebastian Kürten and Wolfgang Mulzer

### **Trajectory Grouping Structure: the Video**

Kevin Buchin, Maike Buchin, Marc van Kreveld, Bettina Speckmann, and Frank Staals

### **Visualizing Hyperbolic Voronoi Diagrams**

Frank Nielsen and Richard Nock

### **Animation of an Algorithm for Drawing Graphs in 3D**

Lezar DeGuzman and Stephen Wismath

### **Visualization of Floater and Gotsman ' s Morphing Algorithm**

Ivaylo Ilinkin

### **Geometric $k$ th Shortest Paths: the Applet**

John Hershberger, Valentin Polishchuk, Bettina Speckmann, and Topi Talvitie

### **Polytope Offsets and Straight Skeletons in 3D**

Franz Aurenhammer and Gernot Walzl

## Session 3a (Monday, 9:15 - 10:55)

### **Optimal Geometric Flows via Dual Programs**

Sylvester Eriksson-Bique, Valentin Polishchuk, and Mikko Sysikaski

### **Sub-linear Time Hybrid Approximations for Least Trimmed Squares Estimator and Related Problems**

Hu Ding and Jinhui Xu

### **Quasi-Polynomial Time Approximation Scheme for Sparse Subsets of Polygons**

Sariel Har-Peled

### **A Near-optimal Approximation Algorithm for Asymmetric TSP on Embedded Graphs**

Jeff Erickson and Anastasios Sidiropoulos

## Session 3b (Monday, 9:15 - 10:55)

### **Outerstring Graphs are $\chi$ -bounded**

Alexandre Rok and Bartosz Walczak

### **Improved Bounds for the Conflict-free Chromatic Art Gallery Problem**

Andreas Bärtzsch, Subir Kumar Ghosh, Matúš Mihalák, Thomas Tschager, and Peter Widmayer

### **Linear Transformation Distance for Bichromatic Matchings**

Oswin Aichholzer, Luis Barba, Thomas Hackl, Alexander Pilz, and Birgit Vogtenhuber

### **Delaunay Triangulations with Disconnected Realization Spaces**

Arnau Padrol and Louis Theran

## Session 3c (Monday, 9:15 - 10:55)

### **Eliminating Tverberg Points, I. An Analogue of the Whitney Trick**

Isaac Mabillard and Uli Wagner

### **Higher Dimensional Cheeger Inequalities**

Anna Gundert and May Szedlák

### **Incidences between Points and Lines in $\mathbb{R}^4$**

Micha Sharir and Noam Solomon

### **On Triple Intersections of three Families of Unit Circles**

Orit E. Raz, Micha Sharir, and József Solymosi

## Session 4a (Monday, 11:15 - 12:30)

### **Finding the Largest Disk Containing a Query Point in Logarithmic Time with Linear Storage**

Tal Kaminker and Micha Sharir

### **Smallest Enclosing Ball for Probabilistic Data**

Alexander Munteanu, Christian Sohler, and Dan Feldman

### **Peeling Potatoes Near-optimally in Near-linear Time**

Sergio Cabello, Josef Cibulka, Jan Kynčl, Maria Saumell, and Pavel Valtr

## Session 4b (Monday, 11:15 - 12:30)

### **On the Complexity of Randomly Weighted Voronoi Diagrams**

Sariel Har-Peled and Benjamin Raichel

### **A Census of Plane Graphs with Polyline Edges**

Andrea Francke and Csaba Toth

### **Polynomials Vanishing on Grids: The Elekes-Rónyai Problem Revisited**

Orit E. Raz, Micha Sharir, and József Solymosi

## Session 4c (Monday, 11:15 - 12:30)

### **Using Convex Relaxations for Efficiently and Privately Releasing Marginals**

Cynthia Dwork, Aleksandar Nikolov, and Kunal Talwar

### **Near-Linear Algorithms for Geometric Hitting Sets and Set Covers**

Pankaj K. Agarwal and Jiangwei Pan

### **Better Embeddings for Planar Earth-Mover Distance over Sparse Sets**

Artūrs Bačkurs and Piotr Indyk

## Session 5a (Tuesday, 9:15 - 10:55)

### **Higher-Quality Tetrahedral Mesh Generation for Domains with Small Angles by Constrained Delaunay Refinement**

Jonathan Shewchuk and Hang Si

### **On the Reconstruction of Convex Sets from Random Normal Measurements**

Hiba Abdallah and Quentin Mérigot

### **Intersection of Paraboloids and Application to Minkowski-Type Problems**

Pedro Machado Manhães de Castro, Quentin Mérigot, and Boris Thibert

### **Efficient Random-Walk Methods for Approximating Polytope Volume**

Ioannis Emiris and Vissarion Fisikopoulos

## Session 5b (Tuesday, 9:15 - 10:55)

### **The Persistent Homology of Distance Functions under Random Projection**

Don Sheehy

### **Discrete Systolic Inequalities and Decompositions of Triangulated Surfaces**

Éric Colin de Verdière, Alfredo Hubard, and Arnaud de Mesmay

### **Computing Topological Persistence for Simplicial Maps**

Tamal Dey, Fengtao Fan, and Yusu Wang

### **Induced Matchings of Barcodes and the Algebraic Stability of Persistence**

Ulrich Bauer and Michael Lesnick

## Session 6 (Tuesday, 11:15 - 12:15)

### **Towards Expressive 3D Modelling: new challenges for geometric computing (invited talk)**

Marie-Paule Cani

## Session 7a (Tuesday, 13:30 - 14:20)

### **Computing the Fréchet Distance with Shortcuts is NP-hard**

Maike Buchin, Anne Driemel, and Bettina Speckmann

**The Discrete Fréchet Distance with Shortcuts via Approximate Distance Counting and Selection**

Rinat Ben Avraham, Omrit Filtser, Haim Kaplan, Matthew Katz, and Micha Sharir

**Session 7b (Tuesday, 13:30 - 14:20)**

**A Framework for Computing the Greedy Spanner**

Quirijn Bouts, Alex Ten Brink, and Kevin Buchin

**Continuously Flattening Polyhedra Using Straight Skeletons**

Zachary Abel, Erik D. Demaine, Martin Demaine, Jin-Ichi Itoh, Anna Lubiw, Chie Nara, and Joseph O'Rourke

**Session 7c (Tuesday, 13:30 - 14:20)**

**Two-Point  $L_1$  Shortest Path Queries in the Plane**

Danny Z. Chen, Rajasekhar Inkulu, and Haitao Wang

**Better  $\varepsilon$ -Dependencies for Offline Approximate Nearest Neighbor Search, Euclidean Minimum Spanning Trees, and  $\varepsilon$ -Kernels**

Sunil Arya and Timothy M. Chan

**Session 8a (Wednesday, 9:15 - 10:55)**

**Free Edge Lengths in Plane Graphs**

Zachary Abel, Robert Connelly, Sarah Eisenstat, Radoslav Fulek, Filip Morić, Yoshio Okamoto, Tibor Szabó, and Csaba Tóth

**Weight Balancing on Boundaries and Skeletons**

Luis Barba, Jean Lou De Carufel, Otfried Cheong, Michael Dobbins, Rudolf Fleischer, Akitoshi Kawamura, Matias Korman, Yoshio Okamoto, János Pach, Yuan Tang, Takeshi Tokuyama, Sander Verdonschot, and Tianhao Wang

**Separation by Convex Pseudo-Circles**

Nicolas Chevallier, Augustin Fruchard, Dominique Schmitt, and Jean-Claude Spehner

**Euclidean Steiner Shallow-Light Trees**

Shay Solomon

**Session 8b (Wednesday, 9:15 - 10:55)**

**Measuring Distance between Reeb Graphs**

Ulrich Bauer, Xiaoyin Ge, and Yusu Wang

**Stochastic Convergence of Persistence Landscapes and Silhouettes**

Frédéric Chazal, Brittany Terese Fasy, Fabrizio Lecci, Alessandro Rinaldo, and Larry Wasserman

**The Morse Theory of Čech and Delaunay Filtrations**

Ulrich Bauer and Herbert Edelsbrunner

**Gromov-Hausdorff Approximation of Filament Structure Using Reeb-type Graph**

Frédéric Chazal and Jian Sun

**Session 9a (Wednesday, 11:15 - 12:55)**

**Metric Embedding, Hyperbolic Space, and Social Networks**

Kevin Verbeek and Subhash Suri

**Sampling with Removal in LP-type Problems**

Bernd Gärtner

**Liftings and Stresses for Planar Periodic Frameworks**

Ciprian Borcea and Ileana Streinu

**The Opaque Square**

Adrian Dumitrescu and Minghui Jiang

**Session 9b (Wednesday, 11:15 - 12:55)**

**Merge Graphs of Join and Split Trees**

Suyi Wang, Yusu Wang, and Rephael Wenger

**Distinct Distances on Algebraic Curves in the Plane**

János Pach and Frank de Zeeuw

**Lower Bounds on Geometric Ramsey Functions**

Marek Eliáš, Jiří Matoušek, Edgardo Roldán-Pensado, and Zuzana Safernová

**Curves in  $\mathbb{R}^d$  Intersecting every Hyperplane at most  $d + 1$  Times**

Imre Bárány, Jiří Matoušek, and Attila Pór