

45th International Colloquium on Automata, Languages, and Programming

ICALP 2018, Prague, Czech Republic, July 9–13, 2018

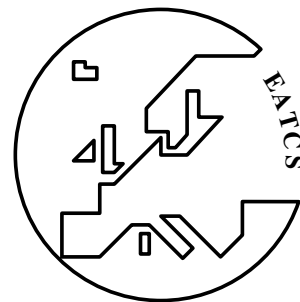
Edited by

Ioannis Chatzigiannakis

Christos Kaklamanis

Dániel Marx

Donald Sannella



Editors

Ioannis Chatzigiannakis
Department of Computer, Control,
and Management Engineering
Sapienza University of Rome
ichatz@dis.uniroma1.it

Dániel Marx
Institute for Computer Science and Control
Hungarian Academy of Sciences
dmarx@cs.bme.hu

Christos Kaklamanis
Department of Computer Engineering and Informatics
University of Patras and
CTI "Diophantus"
ckakl@cti.gr

Donald Sannella
School of Informatics
University of Edinburgh
dts@inf.ed.ac.uk

ACM Classification 2012

Theory of computation

ISBN 978-3-95977-076-7

Published online and open access by

Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at <http://www.dagstuhl.de/dagpub/978-3-95977-076-7>.

Publication date

July, 2018

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

License

This work is licensed under a Creative Commons Attribution 3.0 Unported license (CC-BY 3.0): <http://creativecommons.org/licenses/by/3.0/legalcode>.



In brief, this license authorizes each and everybody to share (to copy, distribute and transmit) the work under the following conditions, without impairing or restricting the authors' moral rights:

- Attribution: The work must be attributed to its authors.

The copyright is retained by the corresponding authors.

Digital Object Identifier: 10.4230/LIPIcs.ICALP.2018.0

ISBN 978-3-95977-076-7

ISSN 1868-8969

<http://www.dagstuhl.de/lipics>

LIPICs – Leibniz International Proceedings in Informatics

LIPICs is a series of high-quality conference proceedings across all fields in informatics. LIPICs volumes are published according to the principle of Open Access, i.e., they are available online and free of charge.

Editorial Board

- Luca Aceto (*Chair*, Gran Sasso Science Institute and Reykjavik University)
- Susanne Albers (TU München)
- Chris Hankin (Imperial College London)
- Deepak Kapur (University of New Mexico)
- Michael Mitzenmacher (Harvard University)
- Madhavan Mukund (Chennai Mathematical Institute)
- Anca Muscholl (University Bordeaux)
- Catuscia Palamidessi (INRIA)
- Raimund Seidel (Saarland University and Schloss Dagstuhl – Leibniz-Zentrum für Informatik)
- Thomas Schwentick (TU Dortmund)
- Reinhard Wilhelm (Saarland University)

ISSN 1868-8969

<http://www.dagstuhl.de/lipics>

■ Contents

| | |
|---|-----------------|
| Preface | |
| <i>Ioannis Chatzigiannakis, Christos Kaklamanis, Dániel Marx, and Donald Sannella</i> | 0:xv–0:xvi |
| Organization | |
| | 0:xvii–0:xxv |
| List of Authors | |
| | 0:xxvii–0:xlvii |

Invited Papers

| | |
|---|----------|
| Consistent Distributed Memory Services: Resilience and Efficiency | |
| <i>Theophanis Hadjistasi and Alexander A. Schwarzmann</i> | 1:1–1:19 |
| Sparsity – an Algorithmic Perspective | |
| <i>Jaroslav Nešetřil</i> | 2:1–2:1 |
| Probability Theory from a Programming Perspective | |
| <i>Sam Staton</i> | 3:1–3:1 |
| Lower Bounds by Algorithm Design: A Progress Report | |
| <i>Richard Ryan Williams</i> | 4:1–4:1 |

Track A: Algorithms, Complexity, and Games

| | |
|---|------------|
| Power of d Choices with Simple Tabulation | |
| <i>Anders Aamand, Mathias Bæk Tejs Knudsen, and Mikkel Thorup</i> | 5:1–5:14 |
| One-Way Trail Orientations | |
| <i>Anders Aamand, Niklas Hjuler, Jacob Holm, and Eva Rotenberg</i> | 6:1–6:13 |
| Dynamic Matching: Reducing Integral Algorithms to Approximately-Maximal Fractional Algorithms | |
| <i>Moab Arar, Shiri Chechik, Sarel Cohen, Cliff Stein, and David Wajc</i> | 7:1–7:16 |
| Tighter Connections Between Formula-SAT and Shaving Logs | |
| <i>Amir Abboud and Karl Bringmann</i> | 8:1–8:18 |
| New Approximation Algorithms for (1,2)-TSP | |
| <i>Anna Adamaszek, Matthias Mnich, and Katarzyna Paluch</i> | 9:1–9:14 |
| Union of Hypercubes and 3D Minkowski Sums with Random Sizes | |
| <i>Pankaj K. Agarwal, Haim Kaplan, and Micha Sharir</i> | 10:1–10:15 |
| Noise-Tolerant Testing of High Entanglement of Formation | |
| <i>Rotem Arnon-Friedman and Henry Yuen</i> | 11:1–11:12 |
| A Complete Dichotomy for Complex-Valued Holant ^c | |
| <i>Miriam Backens</i> | 12:1–12:14 |



| | |
|---|------------|
| Tight Bounds on Online Checkpointing Algorithms <i>Achiya Bar-On, Itai Dinur, Orr Dunkelman, Rani Hod, Nathan Keller, Eyal Ronen, and Adi Shamir</i> | 13:1–13:13 |
| Fast Reed-Solomon Interactive Oracle Proofs of Proximity <i>Eli Ben-Sasson, Iddo Bentov, Yinon Horesh, and Michael Riabzev</i> | 14:1–14:17 |
| NP-Hardness of Coloring 2-Colorable Hypergraph with Poly-Logarithmically Many Colors <i>Amey Bhangale</i> | 15:1–15:11 |
| Sublinear Algorithms for MAXCUT and Correlation Clustering <i>Aditya Bhaskara, Samira Daruki, and Suresh Venkatasubramanian</i> | 16:1–16:14 |
| Parameterized Intractability of Even Set and Shortest Vector Problem from Gap-ETH <i>Arnab Bhattacharyya, Suprovat Ghoshal, Karthik C. S., and Pasin Manurangsi</i> .. | 17:1–17:15 |
| Rollercoasters and Caterpillars <i>Therese Biedl, Ahmad Biniiaz, Robert Cummings, Anna Lubiw, Florin Manea, Dirk Nowotka, and Jeffrey Shallit</i> | 18:1–18:15 |
| New algorithms for Steiner tree reoptimization <i>Davide Bilò</i> | 19:1–19:14 |
| Efficient Shortest Paths in Scale-Free Networks with Underlying Hyperbolic Geometry <i>Thomas Bläsius, Cedric Freiberger, Tobias Friedrich, Maximilian Katzmann, Felix Montenegro-Retana, and Marianne Thieffry</i> | 20:1–20:14 |
| Approximate Convex Hull of Data Streams <i>Avrim Blum, Vladimir Braverman, Ananya Kumar, Harry Lang, and Lin F. Yang</i> | 21:1–21:13 |
| Small Bias Requires Large Formulas <i>Andrej Bogdanov</i> | 22:1–22:12 |
| Geodesic Obstacle Representation of Graphs <i>Prosenjit Bose, Paz Carmi, Vida Dujmovic, Saeed Mehrabi, Fabrizio Montecchiani, Pat Morin, and Luis Fernando Schultz Xavier da Silveira</i> | 23:1–23:13 |
| The Bottleneck Complexity of Secure Multiparty Computation <i>Elette Boyle, Abhishek Jain, Manoj Prabhakaran, and Ching-Hua Yu</i> | 24:1–24:16 |
| Revisiting Frequency Moment Estimation in Random Order Streams <i>Vladimir Braverman, Emanuele Viola, David P. Woodruff, and Lin F. Yang</i> | 25:1–25:14 |
| Proportional Approval Voting, Harmonic k-median, and Negative Association <i>Jarosław Byrka, Piotr Skowron, and Krzysztof Sornat</i> | 26:1–26:14 |
| Fine-Grained Derandomization: From Problem-Centric to Resource-Centric Complexity <i>Marco L. Carmosino, Russell Impagliazzo, and Manuel Sabin</i> | 27:1–27:16 |
| Ranking with Fairness Constraints <i>L. Elisa Celis, Damian Straszak, and Nisheeth K. Vishnoi</i> | 28:1–28:15 |

| | |
|---|------------|
| Interpolating between k -Median and k -Center: Approximation Algorithms for Ordered k -Median | |
| <i>Deeparnab Chakrabarty and Chaitanya Swamy</i> | 29:1–29:14 |
| Generalized Center Problems with Outliers | |
| <i>Deeparnab Chakrabarty and Maryam Negahbani</i> | 30:1–30:14 |
| Orthogonal Point Location and Rectangle Stabbing Queries in 3-d | |
| <i>Timothy M. Chan, Yakov Nekrich, Saladi Rahul, and Konstantinos Tsakalidis</i> | 31:1–31:14 |
| Spanning Tree Congestion and Computation of Generalized Gyóri-Lovász Partition | |
| <i>L. Sunil Chandran, Yun Kuen Cheung, and Davis Issac</i> | 32:1–32:14 |
| Fully Dynamic Almost-Maximal Matching: Breaking the Polynomial Worst-Case Time Barrier | |
| <i>Moses Charikar and Shay Solomon</i> | 33:1–33:14 |
| On Estimating Edit Distance: Alignment, Dimension Reduction, and Embeddings | |
| <i>Moses Charikar, Ofir Geri, Michael P. Kim, and William Kuszmaul</i> | 34:1–34:14 |
| How Hard Is It to Satisfy (Almost) All Roommates? | |
| <i>Jiehua Chen, Danny Hermelin, Manuel Sorge, and Harel Yedidsion</i> | 35:1–35:15 |
| A Quadratic Size-Hierarchy Theorem for Small-Depth Multilinear Formulas | |
| <i>Suryajith Chillara, Nutan Limaye, and Srikanth Srinivasan</i> | 36:1–36:13 |
| Restricted Max-Min Fair Allocation | |
| <i>Siu-Wing Cheng and Yuchen Mao</i> | 37:1–37:13 |
| Improved Approximation for Node-Disjoint Paths in Grids with Sources on the Boundary | |
| <i>Julia Chuzhoy, David H. K. Kim, and Rachit Nimavat</i> | 38:1–38:14 |
| Optimal Hashing in External Memory | |
| <i>Alex Conway, Martín Farach-Colton, and Philip Shilane</i> | 39:1–39:14 |
| Lovász Meets Weisfeiler and Leman | |
| <i>Holger Dell, Martin Grohe, and Gaurav Rattan</i> | 40:1–40:14 |
| Sample-Optimal Identity Testing with High Probability | |
| <i>Ilias Diakonikolas, Themis Gouleakis, John Peebles, and Eric Price</i> | 41:1–41:14 |
| Approximating All-Pair Bounded-Leg Shortest Path and APSP-AF in Truly-Subcubic Time | |
| <i>Ran Duan and Hanlin Ren</i> | 42:1–42:12 |
| Single-Source Bottleneck Path Algorithm Faster than Sorting for Sparse Graphs | |
| <i>Ran Duan, Kaifeng Lyu, and Yuanhang Xie</i> | 43:1–43:14 |
| Improved Time Bounds for All Pairs Non-decreasing Paths in General Digraphs | |
| <i>Ran Duan, Yong Gu, and Le Zhang</i> | 44:1–44:14 |
| Edit Distance between Unrooted Trees in Cubic Time | |
| <i>Bartłomiej Dudek and Paweł Gawrychowski</i> | 45:1–45:14 |

| | |
|---|------------|
| A Note on Two-Colorability of Nonuniform Hypergraphs <i>Lech Duraj, Grzegorz Gutowski, and Jakub Kozik</i> | 46:1–46:13 |
| Additive Non-Approximability of Chromatic Number in Proper Minor-Closed Classes <i>Zdeněk Dvořák and Ken-ichi Kawarabayashi</i> | 47:1–47:12 |
| How to Navigate Through Obstacles? <i>Eduard Eiben and Iyad Kanj</i> | 48:1–48:13 |
| Faster Algorithms for Integer Programs with Block Structure <i>Friedrich Eisenbrand, Christoph Hunkenschroder, and Kim-Manuel Klein</i> | 49:1–49:13 |
| On the Probe Complexity of Local Computation Algorithms <i>Uriel Feige, Boaz Patt-Shamir, and Shai Vardi</i> | 50:1–50:14 |
| Fully-Dynamic Bin Packing with Little Repacking <i>Björn Feldkord, Matthias Feldotto, Anupam Gupta, Guru Guruganesh, Amit Kumar, Sören Riechers, and David Wajc</i> | 51:1–51:24 |
| A Sublinear Tester for Outerplanarity (and Other Forbidden Minors) With One-Sided Error <i>Hendrik Fichtenberger, Reut Levi, Yadu Vasudev, and Maximilian Wötzel</i> | 52:1–52:14 |
| Parameterized Low-Rank Binary Matrix Approximation <i>Fedor V. Fomin, Petr A. Golovach, and Fahad Panolan</i> | 53:1–53:16 |
| Towards Blackbox Identity Testing of Log-Variate Circuits <i>Michael A. Forbes, Sumanta Ghosh, and Nitin Saxena</i> | 54:1–54:16 |
| Finding Cliques in Social Networks: A New Distribution-Free Model <i>Jacob Fox, Tim Roughgarden, C. Seshadhri, Fan Wei, and Nicole Wein</i> | 55:1–55:15 |
| A PTAS for a Class of Stochastic Dynamic Programs <i>Hao Fu, Jian Li, and Pan Xu</i> | 56:1–56:14 |
| Semi-Supervised Algorithms for Approximately Optimal and Accurate Clustering <i>Buddhima Gamlath, Sangxia Huang, and Ola Svensson</i> | 57:1–57:14 |
| High Probability Frequency Moment Sketches <i>Sumit Ganguly and David P. Woodruff</i> | 58:1–58:15 |
| Quasi-PTAS for Scheduling with Precedences using LP Hierarchies <i>Shashwat Garg</i> | 59:1–59:13 |
| ARRIVAL: Next Stop in CLS <i>Bernd Gärtner, Thomas Dueholm Hansen, Pavel Hubáček, Karel Král, Hagar Mosaad, and Veronika Slívová</i> | 60:1–60:13 |
| Improved Bounds for Shortest Paths in Dense Distance Graphs <i>Paweł Gawrychowski and Adam Karczmarz</i> | 61:1–61:15 |
| Towards Unified Approximate Pattern Matching for Hamming and L_1 Distance <i>Paweł Gawrychowski and Przemysław Uznański</i> | 62:1–62:13 |
| A Faster Construction of Greedy Consensus Trees <i>Paweł Gawrychowski, Gad M. Landau, Wing-Kin Sung, and Oren Weimann</i> | 63:1–63:14 |

| | |
|---|------------|
| A Faster FPTAS for #Knapsack <i>Paweł Gawrychowski, Liran Markin, and Oren Weimann</i> | 64:1–64:13 |
| Towards Optimal Approximate Streaming Pattern Matching by Matching Multiple Patterns in Multiple Streams <i>Shay Golan, Tsvi Kopelowitz, and Ely Porat</i> | 65:1–65:16 |
| Gray Codes and Symmetric Chains <i>Petr Gregor, Sven Jäger, Torsten Mütze, Joe Sawada, and Kaja Wille</i> | 66:1–66:14 |
| An Improved Isomorphism Test for Bounded-Tree-Width Graphs <i>Martin Grohe, Daniel Neuen, Pascal Schweitzer, and Daniel Wiebking</i> | 67:1–67:14 |
| A Polynomial-Time Approximation Algorithm for All-Terminal Network Reliability <i>Heng Guo and Mark Jerrum</i> | 68:1–68:12 |
| Perfect Simulation of the Hard Disks Model by Partial Rejection Sampling <i>Heng Guo and Mark Jerrum</i> | 69:1–69:10 |
| Non-Preemptive Flow-Time Minimization via Rejections <i>Anupam Gupta, Amit Kumar, and Jason Li</i> | 70:1–70:13 |
| Maximizing Profit with Convex Costs in the Random-order Model <i>Anupam Gupta, Ruta Mehta, and Marco Molinaro</i> | 71:1–71:14 |
| Generic Single Edge Fault Tolerant Exact Distance Oracle <i>Manoj Gupta and Aditi Singh</i> | 72:1–72:15 |
| An Exponential Separation Between MA and AM Proofs of Proximity <i>Tom Gur, Yang P. Liu, and Ron D. Rothblum</i> | 73:1–73:15 |
| Isolating a Vertex via Lattices: Polytopes with Totally Unimodular Faces <i>Rohit Gurjar, Thomas Thierauf, and Nisheeth K. Vishnoi</i> | 74:1–74:14 |
| Synchronization Strings: Channel Simulations and Interactive Coding for Insertions and Deletions <i>Bernhard Haeupler, Amirbehshad Shahrashbi, and Ellen Vitercik</i> | 75:1–75:14 |
| Synchronization Strings: List Decoding for Insertions and Deletions <i>Bernhard Haeupler, Amirbehshad Shahrashbi, and Madhu Sudan</i> | 76:1–76:14 |
| Approximate Sparse Linear Regression <i>Sariel Har-Peled, Piotr Indyk, and Sepideh Mahabadi</i> | 77:1–77:14 |
| A Polynomial Time Algorithm to Compute Geodesics in CAT(0) Cubical Complexes <i>Koyo Hayashi</i> | 78:1–78:14 |
| Online Vertex-Weighted Bipartite Matching: Beating $1 - \frac{1}{e}$ with Random Arrivals <i>Zhiyi Huang, Zhihao Gavin Tang, Xiaowei Wu, and Yuhao Zhang</i> | 79:1–79:14 |
| Finding Branch-Decompositions of Matroids, Hypergraphs, and More <i>Jisu Jeong, Eun Jung Kim, and Sang-il Oum</i> | 80:1–80:14 |
| Optimally Sorting Evolving Data <i>Juan Jose Besa, William E. Devanny, David Eppstein, Michael T. Goodrich, and Timothy Johnson</i> | 81:1–81:13 |

| | |
|--|------------|
| Generalized Comparison Trees for Point-Location Problems <i>Daniel M. Kane, Shachar Lovett, and Shay Moran</i> | 82:1–82:13 |
| Stabilizing Weighted Graphs <i>Zhuan Khye Koh and Laura Sanità</i> | 83:1–83:13 |
| Spectrally Robust Graph Isomorphism <i>Alexandra Kolla, Ioannis Koutis, Vivek Madan, and Ali Kemal Sinop</i> | 84:1–84:13 |
| A Parameterized Strongly Polynomial Algorithm for Block Structured Integer Programs <i>Martin Koutecký, Asaf Levin, and Shmuel Onn</i> | 85:1–85:14 |
| Finer Tight Bounds for Coloring on Clique-Width <i>Michael Lampis</i> | 86:1–86:14 |
| A Centralized Local Algorithm for the Sparse Spanning Graph Problem <i>Christoph Lenzen and Reut Levi</i> | 87:1–87:14 |
| Chain, Generalization of Covering Code, and Deterministic Algorithm for k-SAT <i>Sixue Liu</i> | 88:1–88:13 |
| Stable-Matching Voronoi Diagrams: Combinatorial Complexity and Algorithms <i>Gill Barequet, David Eppstein, Michael T. Goodrich, and Nil Mamano</i> | 89:1–89:14 |
| Improved Algorithms for Adaptive Compressed Sensing <i>Vasileios Nakos, Xiaofei Shi, David P. Woodruff, and Hongyang Zhang</i> | 90:1–90:14 |
| Approximate Low-Weight Check Codes and Circuit Lower Bounds for Noisy Ground States <i>Chinmay Nirkhe, Umesh Vazirani, and Henry Yuen</i> | 91:1–91:11 |
| Fully Dynamic MIS in Uniformly Sparse Graphs <i>Krzysztof Onak, Baruch Schieber, Shay Solomon, and Nicole Wein</i> | 92:1–92:14 |
| Strictly Balancing Matrices in Polynomial Time Using Osborne’s Iteration <i>Rafail Ostrovsky, Yuval Rabani, and Arman Yousefi</i> | 93:1–93:11 |
| Parameterized Algorithms for Zero Extension and Metric Labelling Problems <i>Felix Reidl and Magnus Wahlström</i> | 94:1–94:14 |
| An Operational Characterization of Mutual Information in Algorithmic Information Theory <i>Andrei Romashchenko and Marius Zimand</i> | 95:1–95:14 |
| Privacy Preserving Clustering with Constraints <i>Clemens Rösner and Melanie Schmidt</i> | 96:1–96:14 |
| NC Algorithms for Weighted Planar Perfect Matching and Related Problems <i>Piotr Sankowski</i> | 97:1–97:16 |
| Computing Tutte Paths <i>Andreas Schmid and Jens M. Schmidt</i> | 98:1–98:14 |
| A New Approximation Guarantee for Monotone Submodular Function Maximization via Discrete Convexity <i>Tasuku Soma and Yuichi Yoshida</i> | 99:1–99:14 |

| | |
|---|--------------|
| Ring Packing and Amortized FHEW Bootstrapping <i>Daniele Miccianco and Jessica Sorrell</i> | 100:1–100:14 |
| Semi-random Graphs with Planted Sparse Vertex Cuts: Algorithms for Exact and Approximate Recovery <i>Anand Louis and Rakesh Venkat</i> | 101:1–101:15 |
| Load Thresholds for Cuckoo Hashing with Overlapping Blocks <i>Stefan Walzer</i> | 102:1–102:10 |
| Brief Announcement: On Secure m -Party Computation, Commuting Permutation Systems and Unassisted Non-Interactive MPC <i>Navneet Agarwal, Sanat Anand, and Manoj Prabhakaran</i> | 103:1–103:4 |
| Brief Announcement: Characterizing Demand Graphs for (Fixed-Parameter) Shallow-Light Steiner Network <i>Amy Babay, Michael Dinitz, and Zeyu Zhang</i> | 104:1–104:4 |
| Brief Announcement: Zero-Knowledge Protocols for Search Problems <i>Ben Berger and Zvika Brakerski</i> | 105:1–105:5 |
| Brief Announcement: Relaxed Locally Correctable Codes in Computationally Bounded Channels <i>Jeremiah Blocki, Venkata Gandikota, Elena Grigorescu, and Samson Zhou</i> | 106:1–106:4 |
| Brief Announcement: Approximation Schemes for Geometric Coverage Problems <i>Steven Chaplick, Minati De, Alexander Ravsky, and Joachim Spoerhase</i> | 107:1–107:4 |
| Brief Announcement: Bayesian Auctions with Efficient Queries <i>Jing Chen, Bo Li, Yingkai Li, and Pinyan Lu</i> | 108:1–108:4 |
| Brief Announcement: Hamming Distance Completeness and Sparse Matrix Multiplication <i>Daniel Graf, Karim Labib, and Przemysław Uznański</i> | 109:1–109:4 |
| Brief Announcement: Treewidth Modulator: Emergency Exit for DFVS <i>Daniel Lokshantov, M. S. Ramanujan, Saket Saurabh, Roohani Sharma, and Meirav Zehavi</i> | 110:1–110:4 |
| Brief Announcement: Erasure-Resilience Versus Tolerance to Errors <i>Sofya Raskhodnikova and Nithin Varma</i> | 111:1–111:3 |
| Brief Announcement: Bounded-Degree Cut is Fixed-Parameter Tractable <i>Mingyu Xiao and Hiroshi Nagamochi</i> | 112:1–112:6 |

Track B: Logic, Semantics, Automata and Theory of Programming

| | |
|---|--------------|
| Almost Sure Productivity <i>Alejandro Aguirre, Gilles Barthe, Justin Hsu, and Alexandra Silva</i> | 113:1–113:15 |
| O-Minimal Invariants for Linear Loops <i>Shaul Almagor, Dmitry Chistikov, Joël Ouaknine, and James Worrell</i> | 114:1–114:14 |
| Topological Sorting with Regular Constraints <i>Antoine Amarilli and Charles Paperman</i> | 115:1–115:14 |

| | |
|--|--------------|
| On Zero-One and Convergence Laws for Graphs Embeddable on a Fixed Surface <i>Albert Atserias, Stephan Kreutzer, and Marc Noy</i> | 116:1–116:14 |
| Bisimulation Invariant Monadic-Second Order Logic in the Finite <i>Achim Blumensath and Felix Wolf</i> | 117:1–117:13 |
| Binary Reachability of Timed Pushdown Automata via Quantifier Elimination and Cyclic Order Atoms <i>Lorenzo Clemente and Sławomir Lasota</i> | 118:1–118:14 |
| Unboundedness Problems for Languages of Vector Addition Systems <i>Wojciech Czerwiński, Piotr Hofman, and Georg Zetsche</i> | 119:1–119:15 |
| Reachability and Distances under Multiple Changes <i>Samir Datta, Anish Mukherjee, Nils Vortmeier, and Thomas Zeume</i> | 120:1–120:14 |
| When is Containment Decidable for Probabilistic Automata? <i>Laure Daviaud, Marcin Jurdziński, Ranko Lazić, Filip Mazowiecki, Guillermo A. Pérez, and James Worrell</i> | 121:1–121:14 |
| On the Complexity of Infinite Advice Strings <i>Gaëtan Douéneau-Tabot</i> | 122:1–122:13 |
| Resynchronizing Classes of Word Relations <i>María Emilia Descotte, Diego Figueira, and Gabriele Puppis</i> | 123:1–123:13 |
| Reachability Switching Games <i>John Fearnley, Martin Gairing, Matthias Mnich, and Rahul Savani</i> | 124:1–124:14 |
| Costs and Rewards in Priced Timed Automata <i>Martin Fränzle, Mahsa Shirmohammadi, Mani Swaminathan, and James Worrell</i> | 125:1–125:14 |
| First-Order Interpretations of Bounded Expansion Classes <i>Jakub Gajarský, Stephan Kreutzer, Jaroslav Nešetřil, Patrice Ossona de Mendez, Michał Pilipczuk, Sebastian Siebertz, and Szymon Toruńczyk</i> | 126:1–126:14 |
| Randomized Sliding Window Algorithms for Regular Languages <i>Moses Ganardi, Danny Hucke, and Markus Lohrey</i> | 127:1–127:13 |
| Aperiodic points in \mathbb{Z}^2 -subshifts <i>Anael Grandjean, Benjamin Hellouin de Menibus, and Pascal Vanier</i> | 128:1–128:13 |
| Semicomputable Geometry <i>Mathieu Hoyrup, Diego Nava Saucedo, and Don M. Stull</i> | 129:1–129:13 |
| On Computing the Total Variation Distance of Hidden Markov Models <i>Stefan Kiefer</i> | 130:1–130:13 |
| To Infinity and Beyond <i>Ines Klimann</i> | 131:1–131:12 |
| On the Identity Problem for the Special Linear Group and the Heisenberg Group <i>Sang-Ki Ko, Reino Niskanen, and Igor Potapov</i> | 132:1–132:15 |
| Gaifman Normal Forms for Counting Extensions of First-Order Logic <i>Dietrich Kuske and Nicole Schweikardt</i> | 133:1–133:14 |

| | |
|---|--------------|
| Polynomial Vector Addition Systems With States <i>Jérôme Leroux</i> | 134:1–134:13 |
| Reducing CMSO Model Checking to Highly Connected Graphs <i>Daniel Lokshтанov, M. S. Ramanujan, Saket Saurabh, and Meirav Zehavi</i> | 135:1–135:14 |
| An Optimal Bound on the Solution Sets of One-Variable Word Equations and its Consequences <i>Dirk Nowotka and Aleksi Saarela</i> | 136:1–136:13 |
| Separating Without Any Ambiguity <i>Thomas Place and Marc Zeitoun</i> | 137:1–137:14 |
| A Superpolynomial Lower Bound for the Size of Non-Deterministic Complement of an Unambiguous Automaton <i>Mikhail Raskin</i> | 138:1–138:11 |
| The Isomorphism Problem for Finite Extensions of Free Groups Is In PSPACE <i>Géraud Sénizergues and Armin Weiß</i> | 139:1–139:14 |
| Unambiguous Languages Exhaust the Index Hierarchy <i>Michał Skrzypczak</i> | 140:1–140:14 |
| The Beta-Bernoulli process and algebraic effects <i>Sam Staton, Dario Stein, Hongseok Yang, Nathanael L. Ackerman, Cameron E. Freer, and Daniel M. Roy</i> | 141:1–141:15 |
| Uniformization Problems for Synchronizations of Automatic Relations on Words <i>Sarah Winter</i> | 142:1–142:13 |

Track C: Foundations of Networked Computation: Models, Algorithms, and Information Management

| | |
|--|--------------|
| Congestion-Free Rerouting of Flows on DAGs <i>Saeed Akhondian Amiri, Szymon Dudycz, Stefan Schmid, and Sebastian Wiederrecht</i> | 143:1–143:13 |
| Practical and Provably Secure Onion Routing <i>Megumi Ando, Anna Lysyanskaya, and Eli Upfal</i> | 144:1–144:14 |
| Resolving SINR Queries in a Dynamic Setting <i>Boris Aronov, Gali Bar-On, and Matthew J. Katz</i> | 145:1–145:13 |
| Uniform Mixed Equilibria in Network Congestion Games with Link Failures <i>Vittorio Bilò, Luca Moscardelli, and Cosimo Vinci</i> | 146:1–146:14 |
| Byzantine Gathering in Polynomial Time <i>Sébastien Bouchard, Yoann Dieudonné, and Anissa Lamani</i> | 147:1–147:15 |
| Temporal Vertex Cover with a Sliding Time Window <i>Eleni C. Akrida, George B. Mertzios, Paul G. Spirakis, and Viktor Zamaraev</i> | 148:1–148:14 |
| On the Complexity of Sampling Vertices Uniformly from a Graph <i>Flavio Chierichetti and Shahrzad Haddadan</i> | 149:1–149:13 |

| | |
|---|--------------|
| The Price of Stability of Weighted Congestion Games <i>George Christodoulou, Martin Gairing, Yiannis Giannakopoulos, and Paul G. Spirakis</i> | 150:1–150:16 |
| Demand-Independent Optimal Tolls <i>Riccardo Colini-Baldeschi, Max Klimm, and Marco Scarsini</i> | 151:1–151:14 |
| Greedy Algorithms for Online Survivable Network Design <i>Sina Dehghani, Soheil Ehsani, MohammadTaghi Hajiaghayi, Vahid Liaghat, and Saeed Seddighin</i> | 152:1–152:14 |
| Algorithms for Noisy Broadcast with Erasures <i>Ofer Grossman, Bernhard Haeupler, and Sidhanth Mohanty</i> | 153:1–153:12 |
| Efficient Black-Box Reductions for Separable Cost Sharing <i>Tobias Harks, Martin Hoefer, Anja Huber, and Manuel Surek</i> | 154:1–154:15 |
| Price of Anarchy for Mechanisms with Risk-Averse Agents <i>Thomas Kesselheim and Bojana Kodric</i> | 155:1–155:14 |
| Polynomial Counting in Anonymous Dynamic Networks with Applications to Anonymous Dynamic Algebraic Computations <i>Dariusz R. Kowalski and Miguel A. Mosteiro</i> | 156:1–156:14 |
| The Unfortunate-Flow Problem <i>Orna Kupferman and Gal Vardi</i> | 157:1–157:14 |
| Spanning Trees With Edge Conflicts and Wireless Connectivity <i>Magnús M. Halldórsson, Guy Kortsarz, Pradipta Mitra, and Tigran Tonoyan</i> ... | 158:1–158:15 |
| Eigenvector Computation and Community Detection in Asynchronous Gossip Models <i>Frederik Mallmann-Trenn, Cameron Musco, and Christopher Musco</i> | 159:1–159:14 |
| $(\Delta + 1)$ Coloring in the Congested Clique Model <i>Merav Parter</i> | 160:1–160:14 |
| CacheShuffle: A Family of Oblivious Shuffles <i>Sarvar Patel, Giuseppe Persiano, and Kevin Yeo</i> | 161:1–161:13 |
| Brief Announcement: MapReduce Algorithms for Massive Trees <i>MohammadHossein Bateni, Soheil Behnezhad, Mahsa Derakhshan, MohammadTaghi Hajiaghayi, and Vahab Mirrokni</i> | 162:1–162:4 |
| Brief Announcement: Give Me Some Slack: Efficient Network Measurements <i>Ran Ben Basat, Gil Einziger, and Roy Friedman</i> | 163:1–163:5 |
| Brief Announcement: Towards an Abstract Model of User Retention Dynamics <i>Eli Ben-Sasson and Eden Saig</i> | 164:1–164:4 |
| Brief Announcement: Energy Constrained Depth First Search <i>Shantanu Das, Dariusz Dereniowski, and Przemysław Uznański</i> | 165:1–165:5 |

■ Preface

This volume contains the papers presented at ICALP 2018, the 45th edition of the International Colloquium on Automata, Languages and Programming, held in Prague, Czech Republic during July 9–13, 2018. ICALP is a series of annual conferences of the European Association for Theoretical Computer Science (EATCS), which first took place in 1972. This year, the ICALP program consisted of three tracks:

- Track A: Algorithms, Complexity, and Games,
- Track B: Logic, Semantics, Automata and Theory of Programming,
- Track C: Foundations of Networked Computation: Models, Algorithms, and Information Management.

In response to the call for papers, a total 502 submissions were received: 346 for track A, 96 for track B, and 60 for track C. Each submission was assigned to at least three Program Committee members, aided by many subreviewers. Out of these, the committee decided to accept 147 papers for inclusion in the scientific program: 98 papers for Track A, 30 for Track B, and 19 for Track C. The selection was made by the Program Committees based on originality, quality, and relevance to theoretical computer science. The quality of the manuscripts was very high, and many deserving papers could not be selected.

This year ICALP also solicited brief announcements of work in progress with substantial interest for the community. In total 14 brief announcements were accepted for publication: 10 for Track A and 4 for Track C. The selection of the brief announcements was made by the Program Committees.

The EATCS sponsored awards for both a best paper and a best student paper for each of the three tracks, selected by the Program Committees.

The best paper awards were given to the following papers:

- Track A: Heng Guo and Mark Jerrum. “A polynomial-time approximation algorithm for all-terminal network reliability”.
- Track B: Dirk Nowotka and Aleksi Saarela. “An optimal bound on the solution sets of one-variable word equations and its consequences”.
- Track C: Dariusz Kowalski and Miguel A. Mosteiro. “Polynomial Counting in Anonymous Dynamic Networks with Applications to Anonymous Dynamic Algebraic Computations”.

The best student paper awards, for papers that are solely authored by students, were given to the following papers:

- Track A: Shashwat Garg. “Quasi-PTAS for Scheduling with Precedences using LP Hierarchies”.
- Track B: Sarah Winter. “Uniformization problems for synchronizations of automatic relations on words”.

Apart from the contributed talks and the brief announcements, ICALP 2018 included invited presentations by Jaroslav Nešetřil, Alexander Schwarzmann, Sam Staton and Ryan Williams. This volume of the proceedings contains all contributed papers and brief announcements presented at the conference together with the papers and abstracts of the invited speakers.

The program of ICALP 2018 also included presentation of the EATCS Award 2018 to Noam Nisan, the Gödel Prize 2018 to Oded Regev, the Presburger Award 2018 to Aleksander

Mađry, and the EATCS Distinguished Dissertation Award to Bas Ketsman, Ilya Razenshteyn and Aviad Rubinstein.

The program also included a memorial session for Maurice Nivat, the founder of ICALP and EATCS, who passed away in September 2017.

Six satellite events of ICALP were held on 9 July, 2018:

- Modern Online Algorithms (MOLI)
- Game Solving: Theory and Practice
- Parameterized Approximation Algorithms Workshop (PAAW)
- Infinity
- Algorithmic Aspects of Temporal Graphs
- Constrained Recognition Problems

The Summer School on Algorithms and Lower Bounds was organized immediately before ICALP during 6-9 July, 2018, with a follow-up workshop on Monday afternoon. The workshop was a satellite ICALP workshop devoted to presentations by selected participants of the school.

The Summer School on Discrete Mathematics was organized after the conference during 16-20 July, 2018. The event was organized by the Institute of Mathematics of the Czech Academy of Sciences and the Computer Science Institute of Charles University.

We wish to thank all authors who submitted extended abstracts for consideration, the Program Committees for their scholarly effort, and all referees who assisted the Program Committees in the evaluation process. We are also grateful to Anna Kotěšovcová from CONFORG and to Jiří Sgall, Andreas Emil Feldmann, Tomáš Masařík, Michal Opler, Jiří Fiala and Jan Musílek and all the support staff of the Organizing Committee from Charles University for organizing ICALP 2018.

We are grateful for generous support from AVAST and RSJ companies which included both travel grants for young women researchers and students and a direct support of the conference. We thank the School of Computer Science (Charles University, Faculty of Mathematics and Physics) and Center of Excellence - Institute for Theoretical Computer Science (project P202/12/G061 of Czech Science Foundation) for their support.

We would like to thank Jiří Sgall for his continuous support and Paul Spirakis, the president of EATCS, for his generous advice on the organization of the conference.

July 2018

Ioannis Chatzigiannakis
Christos Kaklamanis
Dániel Marx
Donald Sannella

■ Organization

Program Committee

Track A

| | |
|-------------------------------|---|
| Dániel Marx | Hungarian Academy of Sciences, Chair |
| Alexandr Andoni | Columbia University, USA |
| Nikhil Bansal | Eindhoven University of Technology, Netherlands |
| Markus Bläser | Saarland University, Germany |
| Glencora Borradaile | Oregon State University, USA |
| Sergio Cabello | University of Ljubljana, Slovenia |
| Joseph Cheriyan | University of Waterloo, Canada |
| Leah Epstein | University of Haifa, Israel |
| Samuel Fiorini | Université libre de Bruxelles, Belgium |
| Craig Gentry | IBM Research, USA |
| Kasper Green Larsen | Aarhus University, Denmark |
| Giuseppe F. Italiano | Università di Roma “Tor Vergata”, Italy |
| Bart M.P. Jansen | Eindhoven University of Technology, Netherlands |
| Petteri Kaski | Aalto University, Finland |
| Michal Koucký | Charles University, Czech Republic |
| Elias Koutsoupias | Oxford, UK |
| Robert Krauthgamer | Weizmann Institute, Israel |
| Stephan Kreutzer | TU Berlin, Germany |
| Troy Lee | Nanyang Technological University, Singapore |
| Moshe Lewenstein | Bar-Ilan University, Israel |
| Monaldo Mastrolilli | IDSIA, Switzerland |
| Ankur Moitra | MIT, USA |
| Seffi Naor | Technion, Israel |
| Seth Pettie | University of Michigan, USA |
| Michał Pilipczuk | University of Warsaw, Poland |
| Alon Rosen | Herzliya Interdisciplinary Center, Israel |
| Günter Rote | Freie Universität Berlin, Germany |
| Barna Saha | University of Massachusetts Amherst, USA |
| Anastasios Sidiropoulos | University of Illinois at Chicago, USA |
| Daniel Štefankovič | University of Rochester, USA |
| Maxim Sviridenko | Yahoo Research, USA |
| Virginia Vassilevska Williams | MIT, USA |
| Gerhard Woeginger | RWTH Aachen, Germany |
| Ronald de Wolf | CWI and University of Amsterdam, Netherlands |
| Stanislav Živný | Oxford, UK |

Track B

| | |
|-------------------|---|
| Donald Sannella | Univ of Edinburgh, UK, Chair |
| Nathalie Bertrand | IRISA/INRIA Rennes, France |
| Mikołaj Bojańczyk | Warsaw University, Poland |
| Udi Boker | Interdisciplinary Center Herzliya, Israel |

45th International Colloquium on Automata, Languages, and Programming (ICALP 2018).
Editors: Ioannis Chatzigiannakis, Christos Kaklamanis, Dániel Marx, and Donald Sannella



LIPIC Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany



107:xviii Organization

| | |
|----------------------|---|
| Yuxin Deng | East China Normal University, China |
| Floris Geerts | Univ Antwerp, Belgium |
| Dan Ghica | Univ Birmingham, UK |
| Alexey Gotsman | IMDEA, Spain |
| Jan Hoffmann | CMU, USA |
| Naoki Kobayashi | Univ Tokyo, Japan |
| Martin Lange | Univ Kassel, Germany |
| Dirk Pattinson | Australian National Univ, Australia |
| Femke van Raamsdonk | VU Amsterdam, Netherlands |
| Jean-François Raskin | Univ libre de Bruxelles, Belgium |
| Vladimiro Sassone | Univ Southampton, UK |
| Thomas Schwentick | TU Dortmund, Germany |
| Alex Simpson | Univ Ljubljana, Slovenia |
| Jiří Srba | Aalborg Univ, Denmark |
| Mirco Tribastone | IMT Lucca, Italy |
| Tomáš Vojnar | Brno Univ of Technology, Czech Republic |
| Igor Walukiewicz | CNRS and Univ Bordeaux, France |
| Scott Weinstein | Univ Pennsylvania, USA |

Track C

| | |
|-------------------------|---|
| Christos Kaklamanis | CTI “Diophantus” and University of Patras, Greece, Chair |
| Susanne Albers | TU Munich, Germany |
| Luca Becchetti | Sapienza University of Rome, Italy |
| Ioannis Caragiannis | University of Patras, Greece |
| Andrea Clementi | University of Rome “Tor Vergata”, Italy |
| Michele Flammini | Gran Sasso Sci Inst and Univ of L’Aquila, Italy |
| Pierre Fraigniaud | CNRS and Université Paris Diderot, France |
| Aristides Gionis | Aalto University, Finland |
| Sudipto Guha | University of Pennsylvania, USA |
| Tomasz Jurdzinski | University of Wroclaw, Poland |
| Evangelos Kranakis | Carleton University, Canada |
| Danny Krizanc | Wesleyan University, USA |
| Katrina Ligett | California Institute of Technology, USA and Hebrew University, Israel |
| Marios Mavronicolas | University of Cyprus, Cyprus |
| Kobbi Nissim | Georgetown University, USA |
| Marina Papatriantafidou | Chalmers University of Technology, Sweden |
| Andrzej Pelc | Université du Québec en Outaouais, Canada |
| David Peleg | Weizmann Institute of Science, Israel |
| Geppino Pucci | University of Padova, Italy |
| Christian Scheideler | Paderborn University, Germany |
| Roger Wattenhofer | ETH Zurich, Switzerland |

Organizing Committee

| | |
|-----------------------|--|
| Jiří Sgall | Charles University, Czech Republic, Conference Chair |
| Anna Kotěšovcová | CONFORG, Czech Republic |
| Andreas Emil Feldmann | Charles University, Czech Republic |
| Tomáš Masařík | Charles University, Czech Republic |
| Michal Opler | Charles University, Czech Republic |
| Jiří Fiala | Charles University, Czech Republic |
| Jan Musílek | Charles University, Czech Republic |

Financial Sponsors



Additional Reviewers

| | | |
|-----------------------|----------------------------|---------------------------|
| Anders Aamand | Mohammad Ali Abam | Amir Abboud |
| Rupam Acharyya | Anil Ada | Raghavendra Addanki |
| Peyman Afshani | Divesh Aggarwal | Manindra Agrawal |
| Saba Ahmadi | S. Akshay | Xavier Allamigeon |
| Shaull Almagor | Josh Alman | Noga Alon |
| Helmut Alt | Joel Alwen | Andris Ambainis |
| Nima Anari | Leonardo Aniello | Simon Apers |
| Itai Arad | Myrto Arapinis | Srinivasan Arunachalam |
| Kazuyuki Asada | Gilad Asharov | Andrei Asinowski |
| Cigdem Aslay | Sepehr Assadi | Chen Attias |
| Chen Avin | Yossi Azar | Haris Aziz |
| Yakov Babichenko | Arturs Backurs | Saikrishna Badrinarayanan |
| Eric Balkanski | Marshall Ball | Alkida Balliu |
| János Balogh | Stephanie Balzer | Jørgen Bang-Jensen |
| Bahareh Banyassady | Amotz Bar-Noy | Ran Ben Basat |
| Felix Baschenis | Mohammadhossein Bateni | Tugkan Batu |
| Paul Beame | Djamal Belazzougui | Paul Bell |
| Alexander Belov | Omri Ben-Eliezer | Souha Ben-Rayana |
| Nikola Benes | Iddo Bentov | Suman Kalyan Bera |
| Sebastian Berndt | Aaron Bernstein | Ivona Bezakova |
| Aditya Bhaskara | Sayan Bhattacharya | Marcin Bienkowski |
| Philip Bille | Davide Bilò | Vittorio Bilò |
| Ahmad Biniaz | Nir Bitansky | Henrik Björklund |
| Jaroslav Blasiok | Ivan Bliznets | Achim Blumensath |
| Hans L. Bodlaender | Greg Bodwin | Magnus Bordewich |
| Ralph Bottesch | Patricia Bouyer | Zvika Brakerski |
| Cornelius Brand | Vladimir Braverman | Thomas Brihaye |
| Karl Bringmann | Sabine Broda | Gerth Stølting Brodal |
| Joshua Brody | Vaclav Brozek | Kevin Buchin |
| Boris Bukh | Sam Buss | Jaroslav Byrka |
| Karthik C. S. | Yang Cai | Clément Canonne |
| Arnaud Carayol | Clément Carbonnel | Timothy Carpenter |
| Matteo Ceccareello | Keren Censor-Hillel | Amit Chakrabarti |
| Deeparnab Chakrabarty | Diptarka Chakraborty | Sourav Chakraborty |
| Parinya Chalermsook | Jeremie Chalopin | T-H. Hubert Chan |
| Timothy M. Chan | Karthekeyan Chandrasekaran | Hsien-Chih Chang |
| Yi-Jun Chang | Melissa Chase | Arkadev Chattopadhyay |
| Shiri Chechik | Jiecao Chen | Sitan Chen |
| Xi Chen | Yijia Chen | Yu-Fang Chen |
| Siu-Wing Cheng | Victor Chepoi | Dmitry Chistikov |
| Rajesh Chitnis | Eden Chlamtac | Keerti Choudhary |
| George Christodoulou | Lorenzo Clemente | Jonas Cleve |
| Raphaël Clifford | Adrien Le Coënt | Avi Cohen |
| Edith Cohen | Ilan Cohen | Vincent Cohen-Addad |
| Thomas Colcombet | Denis Cornaz | Ágnes Cseh |

| | | |
|-----------------------|----------------------------|--------------------------|
| Radu Curticapean | Lukasz Czajka | Artur Czumaj |
| Dana Dachman-Soled | Hadassa Daltrophe | Ankush Das |
| Anupam Das | Laure Daviaud | Anuj Dawar |
| Anindya De | Éric Colin de Verdière | Giorgio Delzanno |
| Stéphane Demri | Michael Dinitz | Michael Gene Dobbins |
| David Doty | Ran Duan | Vida Dujmovic |
| Adrian Dumitrescu | Romaric Dunignau | Martin Dyer |
| Rüdiger Ehlers | Eduard Eiben | Friedrich Eisenbrand |
| David Eisenstat | Khaled Elbassioni | Lior Eldar |
| Jörg Endrullis | Matthias Englert | Hossein Esfandiari |
| Guy Even | Esther Ezra | Yuri Faenza |
| Yaron Fairstein | Jittat Fakcharoenphol | Carlo Fantozzi |
| Bill Fefferman | Uriel Feige | Moran Feldman |
| Andreas Emil Feldmann | Michael Feldmann | Stefan Felsner |
| Henning Fernau | Diego Figueira | Nathanaël Fijalkow |
| Emmanuel Filiot | Aris Filos-Ratsikas | Arnold Filtser |
| Francesca Fiorenzi | Johannes Fischer | Orr Fischer |
| Tamás Fleiner | Krzysztof Fleszar | Till Fluschnik |
| Fedor Fomin | Casper Benjamin Freksen | Dominik D. Freydenberger |
| Tobias Friedrich | Alan Frieze | Zachary Friggstad |
| Vincent Froese | Radoslav Fulek | Peter Fulla |
| Benjamin Fuller | Peter Gacs | Travis Gagie |
| Andreas Galanis | Nicolas Gama | Venkata Gandikota |
| Pierre Ganty | Sumegha Garg | Paul Gastin |
| Olivier Gauwin | Pawel Gawrychowski | Gilles Geeraerts |
| Samir Genaim | Georgios Georgiadis | Loukas Georgiadis |
| Shayan Oveis Gharan | Panos Giannopoulos | Hugo Gimbert |
| Alex Gittens | Vasilis Gkatzelis | Shay Golan |
| Leslie Ann Goldberg | Paul Goldberg | Elazar Goldenberg |
| Isaac Goldstein | Stefan Göller | Petr Golovach |
| Alexander Golovnev | Michael T. Goodrich | Sivakanth Gopi |
| Thorsten Götte | Lee-Ad Gottlieb | Themis Gouleakis |
| Fabrizio Grandoni | Roland Grappe | Alexander Grigoriev |
| Alex Bredariol Grilo | Martin Grohe | Allan Grønlund |
| Roberto Grossi | Luciano Gualà | Bruno Guillon |
| Heng Guo | Jiong Guo | Krystal Guo |
| Anupam Gupta | Manoj Gupta | Sushmita Gupta |
| Tom Gur | Venkatesan Guruswami | Julian Gutierrez |
| Torben Hagerup | Mohammadtaghi Hajiaghayi | Nir Halman |
| Samuel Haney | Kristoffer Arnsfelt Hansen | Thomas Dueholm Hansen |
| Nicolas Hanusse | Sariel Har-Peled | Tero Harju |
| Tobias Harks | David Harris | Prahladh Harsha |
| Tim Hartmann | Carmit Hazay | Brett Hemenway |
| Jacob Hendricks | Frédéric Herbreteau | Kieran Herley |
| Danny Hermelin | John Hershberger | Hiroshi Hirai |
| Denis Hirschfeldt | Petr Hlineny | Rebecca Hoberg |
| Dorit Hochbaum | Martin Hoefler | Frank Hoffmann |
| Michael Hoffmann | Stepan Holub | Stefan Hougardy |
| Mathieu Hoyrup | Justin Hsu | Chien-Chung Huang |
| Dawei Huang | Zhiyi Huang | Pavel Hubáček |

107:xxii Organization

| | | |
|-----------------------|------------------------|--------------------------|
| Vincent Hugot | Norbert Hundeshagen | Christoph Hunkenschroder |
| Thore Husfeldt | Tony Huynh | John Iacono |
| Zvonko Iljazovic | Neil Immerman | Piotr Indyk |
| Vincenzo Iovino | Zahra Jafargholi | Ragesh Jaiswal |
| David Janin | David N. Jansen | T.S. Jayram |
| Mark Jerrum | Artur Jeż | Łukasz Jeż |
| Shaofeng Jiang | Adrian Johnstone | Peter Jonsson |
| Hossein Jowhari | Chiraag Juvekar | Volker Kaibel |
| Christos Kalaitzis | Sagar Kale | Gautam Kamath |
| Lior Kamma | Frank Kammer | Daniel Kane |
| Iyad Kanj | Erez Kantor | Michael Kapralov |
| Aikaterini Karanasiou | Jarkko Kari | Juha Kärkkäinen |
| Zohar Karnin | Takashi Katoh | Isabella Kaufmann |
| Telikepalli Kavitha | Ken-Ichi Kawarabayashi | Steven Kelk |
| Marcel Keller | Hans Kellerer | Dominik Kempa |
| Daniel Kernberger | Thomas Kesselheim | Shahbaz Khan |
| Samir Khuller | Stefan Kiefer | Daniel Kifer |
| Eunjung Kim | Sándor Kisfaludi-Bak | Kim-Manuel Klein |
| Philip Klein | Robert Kleinberg | Boris Klemz |
| Max Klimm | Jan Willem Klop | Katharina Klost |
| Jens Knoop | Dušan Knop | Yusuke Kobayashi |
| Tomasz Kociumaka | Ioannis Kokkinis | Sudeshna Kolay |
| Christina Kolb | Balagopal Komarath | Christian Konrad |
| Spyros Kontogiannis | Tsvi Kopelowitz | Swastik Kopparty |
| Guy Kortsarz | Yiannis Koutis | Karel Král |
| Jan Kratochvil | Klaus Kriegel | S Krishna |
| Jean Krivine | Robert Kübler | Oliver Kullmann |
| Amit Kumar | Mrinal Kumar | Ravi Kumar |
| Marvin Künnemann | Denis Kuperberg | Salvatore La Torre |
| Thijs Laarhoven | Anthony Labarre | Arnaud Labourel |
| Bundit Laekhanukit | Michael Lampis | Patrick Landwehr |
| Julien Lange | Stefan Langerman | Elmar Langetepe |
| Sophie Laplante | Kim S. Larsen | Ślawomir Lasota |
| Silvio Lattanzi | Philip Lazos | Hung Le |
| Euiwoong Lee | Karoliina Lehtinen | Steffen Lemp |
| Ondrej Lengal | Jérôme Leroux | Stefano Leucci |
| Peter Leupold | Reut Levi | Asaf Levin |
| Maxwell Levit | Avivit Levy | Nathan Lhote |
| Jason Li | Jerry Li | Jian Li |
| Ray Li | Yuanzhi Li | Nutan Limaye |
| Didier Lime | Andrea Lincoln | Steven Lindell |
| Nathan Lindzey | Andre Linhares | Quanquan Liu |
| Christof Löding | Maarten Löffler | Markus Lohrey |
| Daniel Lokshtanov | Federico Lombardi | Julian Loss |
| Anand Louis | Shachar Lovett | Hsueh-I Lu |
| Pinyan Lu | Jack H Lutz | James F. Lynch |
| Vladimir Lysikov | Ramanujan M. S. | Mohammad Mahdian |
| Michael Mahoney | Hemanta Maji | Konstantin Makarychev |
| Yury Makarychev | Pasquale Malacaria | Andreas Maletti |
| David Manlove | Giovanni Manzini | Andrea Margheri |

| | | |
|------------------------|--------------------------|---------------------------|
| Nicolas Markey | Euripides Markou | Francisco Martins |
| Tomas Masopust | Antonis Matakos | Bastien Maubert |
| Manuel Mauro | Richard Mayr | Arya Mazumdar |
| Andrew McGregor | Moti Medina | Mohammad Syed Meesum |
| Kurt Mehlhorn | Ruta Mehta | Manor Mendel |
| Massimo Merro | Julian Mestre | Pierre-étienne Meunier |
| Tom Meyerovitch | Theresa Migler-Vondollen | Matúš Mihalák |
| Marius Mikučionis | Martin Milanič | Kevin Milans |
| Carl Miller | Tillmann Miltzow | Pranabendu Misra |
| Joseph Mitchell | Matthias Mnich | Ali Mohades |
| Rolf H. Möhring | Tobias Mömke | Benjamin Moore |
| Cris Moore | Pat Morin | Ben Moseley |
| Dana Moshkovitz | Elchanan Mossel | Shay Mozes |
| Wolfgang Mulzer | Kamesh Munagala | Ian Munro |
| Cameron Musco | Christopher Musco | Torsten Mütze |
| Daniel Nagaj | Viswanath Nagarajan | Anand Natarajan |
| Guyslain Naves | Amir Nayyeri | Amir Nayyeri |
| Mark-Jan Nederhof | Jesper Nederlof | Joe Neeman |
| Ofer Neiman | Adrian Neumann | Ilan Newman |
| Van Chan Ngo | Huy Nguyen | Denis Nicole |
| Matthias Niewerth | Filip Niksic | Gali Noti |
| Krzysztof Nowicki | Marc Noy | Timm Oertel |
| Alexander Okhotin | Igor Carboni Oliveira | Rafael Oliveira |
| Dennis Olivetti | Feyishayo Olukoya | Krzysztof Onak |
| Aurélien Ooms | Sebastian Ordyniak | Mikhail Ostrovskii |
| Yota Otachi | Joël Ouaknine | Youssef Oualhadj |
| Sang-Il Oum | Megan Owen | Kenta Ozeki |
| Rasmus Pagh | Linda Pagli | Dominik Pajak |
| Igor Pak | Konstantinos Panagiotou | Anurag Pandey |
| Gopal Pandurangan | Debmalya Panigrahi | Periklis Papakonstantinou |
| Nikos Parotsidis | Merav Parter | Anat Paskin-Cherniavsky |
| Francesco Pasquale | Erik Paul | Subhabrata Paul |
| Lehilton L. C. Pedrosa | Chris Peikert | Pan Peng |
| Richard Peng | Guillermo Perez | Pablo Pérez-Lantero |
| Will Perkins | Jeff Phillips | Astrid Pieterse |
| Andrea Pietracaprina | Oleg Pikhurko | Marcin Pilipczuk |
| Jean-Eric Pin | Thomas Place | Wojciech Plandowski |
| Vladimir Podolskii | Ely Porat | Gustavo Posta |
| M. Praveen | Eric Price | Kirk Pruhs |
| Pavel Pudlak | Simon Puglisi | Manish Purohit |
| Youming Qiao | Daowen Qiu | Karin Quaas |
| Balaji Raghavachari | Ajitha Rajan | Rajmohan Rajaraman |
| Govind Ramnarayan | Narad Rampersad | Sofya Raskhodnikova |
| Julian Rathke | Gaurav Rattan | Malin Rau |
| Dror Rawitz | Jean-Florent Raymond | Ilya Razenshteyn |
| Vojtech Rehak | Daniel Reichman | Ahmed Rezine |
| Bruce Richter | Havana Rika | Andrej Risteski |
| Liam Roditty | Heiko Röglin | Lars Rohwedder |
| Dana Ron | Adi Rosén | Peter Rossmanith |
| Jurriaan Rot | Marc Roth | Ron Rothblum |

107:xxiv Organization

| | | |
|--------------------------|--------------------------|--------------------------|
| Thomas Rothvoss | Reuben Rowe | Eric Rowland |
| Michał Róžański | Polina Rozenshtein | Atri Rudra |
| Aleksi Saarela | Sushant Sachdeva | S. Cenk Sahinalp |
| Ken Sakayori | Michael Saks | Ario Salmasi |
| Laura Sanita | Piotr Sankowski | Ocan Sankur |
| Rahul Santhanam | Ramprasad Saptarishi | Thatchaphol Saranurak |
| Jayalal Sarma | Kanthi Sarpatwar | Tetsuya Sato |
| Srinivasa Rao Satti | Ignasi Sau | Thomas Sauerwald |
| Nitin Saurabh | Saket Saurabh | Zdenek Sawa |
| Raghuvansh Saxena | Guillaume Scerri | Michael Schapira |
| Nadja Scharf | Sven Schewe | Stefan Schmid |
| Georg Schnitger | Tselil Schramm | Dominique Schroeder |
| Roy Schwartz | Chris Schwiegelshohn | Giacomo Scornavacca |
| Elizabeth Scott | Adam Sealfon | Erel Segal-Halevi |
| Danny Segev | Ilya Sergey | C. Seshadhri |
| Alexander Setzer | Asaf Shapira | Micha Sharir |
| Don Sheehy | Tetsuo Shibuya | Igor Shinkar |
| Tong-Wook Shinn | Aaron Sidford | Sebastian Siebertz |
| Rodrigo Silveira | Francesco Silvestri | Ryoma Sin'Ya |
| Alistair Sinclair | Kritika Singhal | Rene Sitters |
| Alexander Skopalik | Michał Skrzypczak | Shay Solomon |
| Christian Sommer | Fu Song | Aikaterini Sotiraki |
| Christopher Spinrath | Sophie Spirkl | Joachim Spoerhase |
| Vijay Sridhar | Akshayaram Srinivasan | Aravind Srinivasan |
| Nikhil Srivastava | B Srivathsan | Tatiana Starikovskaya |
| Damien Stehle | Fabian Stehn | Florian Steinberg |
| Noah Stephens-Davidowitz | Sebastian Stiller | Thomas Sturm |
| Martin Sulzmann | Scott Summers | Aarthi Sundaram |
| Toshio Suzuki | Ola Svensson | Avishay Tal |
| Navid Talebanfard | Ohad Talmon | Suguru Tamaki |
| Li-Yang Tan | Jakub Tarnawski | Yael Tauman Kalai |
| Justin Thaler | Sharma V. Thankachan | Johan Thapper |
| Dimitrios Thilikos | Dilys Thomas | Francesco Tiezzi |
| Simone Tini | Andreas Tönnis | Tigran Tonoyan |
| Patrick Totzke | Henry Towsner | Ohad Trabelsi |
| Elias Tsakas | Max Tschaikowski | Philippas Tsigas |
| Takeshi Tsukada | Iddo Tzameret | Marc Uetz |
| Yuya Uezato | Seeun William Umboh | Rohit Vaish |
| Ali Vakilian | Leo van Iersel | Erik Jan van Leeuwen |
| Rob van Stee | Anke van Zuylen | Shai Vardi |
| Prashant Vasudevan | Yann Vaxès | Rahul Vaze |
| László A. Végh | Santosh Vempala | Carmine Ventre |
| Nikolay Vereshchagin | José Verschae | Aravindan Vijayaraghavan |
| Cosimo Vinci | Sundar Vishwanathan | Jan Vondrak |
| Nils Vortmeier | Satyanarayana Vusirikala | Nikhil Vyas |
| Magnus Wahlström | Erik Waingarten | David Wajc |
| Johannes Waldmann | Erik Walsberg | Di Wang |
| Yuyi Wang | Justin Ward | Pascal Weil |
| Oren Weimann | Omri Weinstein | Mathias Weller |
| Stefan Weltge | Anthony Widjaja Lin | Andreas Wiese |

Max Willert
Karl Wimmer
Dominik Wojtczak
James Worrell
Pei Wu
Ning Xie
Grigory Yaroslavtsev
Neal Young
Meirav Zehavi
Hanmeng Zhan
Baigong Zheng

Jack Williams
Sarah Winter
Bruno Woltzenlogel Paleo
Marcin Wrochna
Zhilin Wu
Lin F. Yang
Yitong Yin
Huacheng Yu
Marc Zeitoun
Hantao Zhang
Vassilis Zikas

Ryan Williams
Philipp Woelfel
David P. Woodruff
David Wu
Christian Wulff-Nilsen
Mu Yang
Yuichi Yoshida
Or Zamir
Georg Zetsche
Jie Zhang
Charilaos Zisopoulos

■ List of Authors

Anders Aamand
BARC, University of Copenhagen,
Universitetsparken 1, Copenhagen, Denmark
aa@di.ku.dk
<https://orcid.org/0000-0002-0402-0514>

Amir Abboud
IBM Almaden Research Center, San Jose,
USA
amir.abboud@ibm.com

Nathanael L. Ackerman
Harvard Univ

Anna Adamaszek
University of Copenhagen, Denmark
anad@di.ku.dk

Navneet Agarwal
Indian Institute of Technology Bombay
navneet@cse.iitb.ac.in

Pankaj K. Agarwal
Department of Computer Science, Duke
University, Durham, NC 27708, USA
pankaj@cs.duke.edu

Alejandro Aguirre
IMDEA Software Institute, Madrid, Spain

Saeed Akhoondian Amiri
Max-Planck Institute of Informatics,
Germany
samiri@mpi-inf.mpg.de

Eleni C. Akrida
Department of Computer Science, University
of Liverpool, UK
Eleni.Akrida@liverpool.ac.uk
<https://orcid.org/0000-0002-1126-1623>

Shaul Almagor
Department of Computer Science, Oxford
University, UK
shaull.almagor@cs.ox.ac.uk

Antoine Amarilli
LTCI, Télécom ParisTech, Université
Paris-Saclay

Sanat Anand
Indian Institute of Technology Bombay
sanat@cse.iitb.ac.in

Megumi Ando
Computer Science Department, Brown
University, Providence, RI 02912 USA
mando@cs.brown.edu

Moab Arar
Tel Aviv University, Tel Aviv, Israel

Rotem Arnon-Friedman
ETH Zürich, Switzerland
rotema@itp.phys.ethz.ch

Boris Aronov
Department of Computer Science and
Engineering, Tandon School of Engineering,
New York University, Brooklyn, NY 11201,
USA
boris.aronov@nyu.edu

Albert Atserias
Universitat Politècnica de Catalunya,
Barcelona, atserias@cs.upc.edu

Amy Babay
Johns Hopkins University, Baltimore, MD,
USA
babay@cs.jhu.edu

Miriam Backens
Department of Computer Science, University
of Oxford, UK
miriam.backens@cs.ox.ac.uk

Achiya Bar-On
Department of Mathematics, Bar-Ilan
University, Ramat Gan, Israel
abo1000@gmail.com

Gali Bar-On
Department of Computer Science,
Ben-Gurion University of the Negev,
Beer-Sheva 84105, Israel
galibar@post.bgu.ac.il



107:xxviii Authors

- Gill Barequet
Technion - Israel Inst. of Technology, Haifa, Israel
barequet@cs.technion.ac.il
- Gilles Barthe
IMDEA Software Institute, Madrid, Spain
- MohammadHossein Bateni
Google Research, New York
- Soheil Behnezhad
University of Maryland
- Ran Ben Basat
Technion, Haifa, Israel
sran@cs.technion.ac.il
- Eli Ben-Sasson
Department of Computer Science, Technion, Haifa, Israel
eli@cs.technion.ac.il
<https://orcid.org/0000-0002-0708-0483>
- Iddo Bentov
Cornell University, Ithaca, NY, USA
iddo333@gmail.com
- Ben Berger
Weizmann Institute of Science, Rehovot, Israel
ben.berger@weizmann.ac.il
- Juan Jose Besa
Dept. of Computer Science, Univ. of California, Irvine, Irvine, CA 92697 USA
jjbesavi@uci.edu
<https://orcid.org/0000-0002-5676-7011>
- Amey Bhangale
Weizmann Institute of Science, Rehovot, Israel
amey.bhangale@weizmann.ac.il
- Aditya Bhaskara
School of Computing, University of Utah, USA
bhaskara@cs.utah.edu
- Arnab Bhattacharyya
Indian Institute of Science, Bangalore, India
arnabb@iisc.ac.in
- Therese Biedl
School of Computer Science, University of Waterloo, Canada
biedl@uwaterloo.ca
- Davide Bilò
Department of Humanities and Social Sciences, University of Sassari, Via Roma 151, 07100 Sassari (SS), Italy
davide.bilo@uniss.it
<https://orcid.org/0000-0003-3169-4300>
- Vittorio Bilò
Department of Mathematics and Physics, University of Salento, Lecce, Italy
vittorio.bilo@unisalento.it
- Ahmad Biniiaz
School of Computer Science, University of Waterloo, Canada
ahmad.biniiaz@gmail.com
- Jeremiah Blocki
Department of Computer Science, Purdue University, West Lafayette, Indiana, USA
jblocki@purdue.edu
- Avrim Blum
TTI-Chicago, Chicago, United States
avrim@ttic.edu
- Achim Blumensath
Masaryk University Brno
blumens@fi.muni.cz
- Thomas Bläsius
Hasso Plattner Institute, University of Potsdam, Potsdam, Germany
thomas.blaesius@hpi.de
- Andrej Bogdanov
Department of Computer Science and Engineering and , Institute of Theoretical Computer Science and Communications, Chinese University of Hong Kong
andrejb@cse.cuhk.edu.hk
- Prosenjit Bose
School of Computer Science, Carleton University, Ottawa, Canada
jit@scs.carleton.ca

- Sébastien Bouchard
Sorbonne Universités, UPMC Univ Paris 06,
CNRS, INRIA, LIP6 UMR 7606, Paris,
France
sebastien.bouchard@lip6.fr
- Elette Boyle
IDC Herzliya
elette.boyle@idc.ac.il
- Zvika Brakerski
Weizmann Institute of Science, Rehovot,
Israel
zvika.brakerski@weizmann.ac.il
- Vladimir Braverman
Johns Hopkins University, Baltimore, United
States
vova@cs.jhu.edu
- Karl Bringmann
Max Planck Institute for Informatics,
Saarland Informatics Campus, Saarbrücken,
Germany
kbringma@mpi-inf.mpg.de
- Jarosław Byrka
University of Wrocław, Wrocław, Poland
jby@cs.uni.wroc.pl
- Mathias Bæk Tejs Knudsen
University of Copenhagen and Supwiz,
Copenhagen, Denmark
mathias@tejs.dk
<https://orcid.org/0000-0001-5308-9609>
- Karthik C. S.
Weizmann Institute of Science, Rehovot,
Israel
karthik.srikanta@weizmann.ac.il
- Paz Carmi
Department of Computer Science,
Ben-Gurion University of the Negev,
Beer-Sheva, Israel
carmip@cs.bgu.ac.il
- Marco L. Carmosino
Department of Computer Science, University
of California San Diego, La Jolla, CA, USA
marco@ntime.org
- L. Elisa Celis
École Polytechnique Fédérale de Lausanne
(EPFL), Switzerland
- Deeparnab Chakrabarty
Department of Computer Science,
Dartmouth College, 9 Maynard St, Hanover,
NH, USA
deeparnab@dartmouth.edu
- Timothy M. Chan
Dept. of Computer Science, University of
Illinois at Urbana-Champaign, USA
tmc@illinois.edu
- L. Sunil Chandran
Department of Computer Science and
Automation, Indian Institute of Science,
India
sunil@csa.iisc.ernet.in
- Steven Chaplick
Lehrstuhl für Informatik I, Universität
Würzburg, Germany
steven.chaplick@uni-wuerzburg.de
<https://orcid.org/0000-0003-3501-4608>
- Moses Charikar
Department of Computer Science, Stanford
University, Stanford, CA, USA
moses@cs.stanford.edu
- Shiri Chechik
Tel Aviv University, Tel Aviv, Israel
- Jiehua Chen
Ben-Gurion University of the Negev, Beer
Sheva, Israel
jiehua.chen2@gmail.com
- Jing Chen
Department of Computer Science, Stony
Brook University, Stony Brook, NY 11794,
USA
jingchen@cs.stonybrook.edu
- Siu-Wing Cheng
Department of Computer Science and
Engineering, HKUST, Hong Kong
scheng@cse.ust.hk
<https://orcid.org/0000-0002-3557-9935>

Yun Kuen Cheung
Max Planck Institute for Informatics,
Saarland Informatics Campus, Germany
ycheung@mpi-inf.mpg.de
<https://orcid.org/0000-0002-9280-0149>

Flavio Chierichetti
Dipartimento di Informatica, Sapienza
University, Rome, Italy
flavio@di.uniroma1.it
<https://orcid.org/0000-0001-8261-9058>

Suryajith Chillara
Department of CSE, IIT Bombay, Mumbai,
India
suryajith@cse.iitb.ac.in

Dmitry Chistikov
Centre for Discrete Mathematics and its
Applications (DIMAP) & , Department of
Computer Science, University of Warwick,
UK
d.chistikov@warwick.ac.uk

George Christodoulou
Department of Computer Science, University
of Liverpool, Liverpool, UK
G.Christodoulou@liverpool.ac.uk

Julia Chuzhoy
Toyota Technological Institute at Chicago,
6045 S. Kenwood Ave., Chicago, Illinois
60637, USA
cjulia@ttic.edu

Lorenzo Clemente
University of Warsaw
clementelorenzo@gmail.com
<https://orcid.org/0000-0003-0578-9103>

Sarel Cohen
Tel Aviv University, Tel Aviv, Israel

Riccardo Colini-Baldeschi
Core Data Science Group, Facebook Inc., 1
Rathbone Place, London, W1T 1FB, UK
rickuz@fb.com
<https://orcid.org/0000-0001-5739-1178>

Alex Conway
Rutgers University, New Brunswick, NJ,
USA
alexander.conway@rutgers.edu

Robert Cummings
School of Computer Science, University of
Waterloo, Canada
rcummings000@gmail.com

Wojciech Czerwiński
University of Warsaw, Poland
<https://orcid.org/0000-0002-6169-868X>

Samira Daruki
Expedia Research, USA
sdaruki@expedia.com

Shantanu Das
LIS, Aix-Marseille University, University of
Toulon, CNRS, Marseille, France
shantanu.das@lif.univ-mrs.fr

Samir Datta
Chennai Mathematical Institute & UMI
ReLaX, Chennai, India
sdatta@cmi.ac.in

Laure Daviaud
University of Warwick, Coventry, UK
L.Daviaud@warwick.ac.uk

Minati De
Department of Mathematics, Indian
Institute of Technology Delhi, India
minati@maths.iitd.ac.in

Sina Dehghani
University of Maryland, College Park, MD
20742, USA

Holger Dell
Saarland University and Cluster of
Excellence (MMCI), Saarbrücken, Germany
hdell@mmci.uni-saarland.de
<https://orcid.org/0000-0001-8955-0786>

Mahsa Derakhshan
University of Maryland

Dariusz Dereniowski
Faculty of Electronics, Telecommunications
and Informatics, Gdańsk University of
Technology, Gdańsk, Poland
deren@eti.pg.edu.pl
<https://orcid.org/0000-0003-4000-4818>

María Emilia Descotte
LaBRI, Université de Bordeaux

William E. Devanny
Dept. of Computer Science, Univ. of
California, Irvine, Irvine, CA 92697 USA
wdevanny@uci.edu

Ilias Diakonikolas
USC, Los Angeles, CA, USA
diakonik@usc.edu

Yoann Dieudonné
Laboratoire MIS & Université de Picardie
Jules Verne, Amiens, France
yoann.dieudonne@u-picardie.fr

Michael Dinitz
Johns Hopkins University, Baltimore, MD,
USA
mdinitz@cs.jhu.edu

Itai Dinur
Computer Science Department, Ben-Gurion
University, Beer Sheva, Israel
dinuri@cs.bgu.ac.il

Gaëtan Douéneau-Tabot
École Normale Supérieure Paris-Saclay,
Université Paris-Saclay, Cachan, France
gaetan.doueneau@ens-paris-saclay.fr

Ran Duan
Institute for Interdisciplinary Information
Sciences, Tsinghua University, China
duanran@mail.tsinghua.edu.cn

Bartłomiej Dudek
Institute of Computer Science, University of
Wrocław, Poland
bartlomiej.dudek@cs.uni.wroc.pl

Szymon Dudycz
University of Wrocław, Poland
szymon.dudycz@gmail.com

Vida Dujmovic
School of Computer Science and Electrical
Engineering, University of Ottawa, Ottawa,
Canada
vida.dujmovic@uottawa.ca

Orr Dunkelman
Computer Science Department, University of
Haifa, Haifa, Israel
orrd@cs.haifa.ac.il
<https://orcid.org/0000-0001-5799-2635>

Lech Duraj
Theoretical Computer Science Department,
Faculty of Mathematics and Computer
Science, Jagiellonian University, Kraków,
Poland
lech.duraj@uj.edu.pl

Zdeněk Dvořák
Charles University, Malostranske namesti 25,
11800 Prague, Czech Republic
rakdver@iuuk.mff.cuni.cz
<https://orcid.org/0000-0002-8308-9746>

Soheil Ehsani
University of Maryland, College Park, MD
20742, USA

Eduard Eiben
Department of Informatics, University of
Bergen, Bergen, Norway
eduard.eiben@uib.no
<https://orcid.org/0000-0003-2628-3435>

Gil Einziger
Nokia Bell Labs, Kfar Saba, Israel
gil.einziger@nokia.com

Friedrich Eisenbrand
EPFL, 1015 Lausanne, Switzerland
friedrich.eisenbrand@epfl.ch

David Eppstein
Dept. of Computer Science, Univ. of
California, Irvine, Irvine, CA 92697 USA
eppstein@uci.edu

Martín Farach-Colton
Rutgers University, New Brunswick, NJ,
USA
farach@rutgers.edu

John Fearnley
University of Liverpool, UK
john.fearnley@liverpool.ac.uk

Uriel Feige
Weizmann Institute of Science, Rehovot,
Israel
uriel.feige@weizmann.ac.il

Björn Feldkord
Paderborn University, Paderborn, Germany

107:xxxii Authors

- Matthias Feldotto
Paderborn University, Paderborn, Germany
- Hendrik Fichtenberger
TU Dortmund, Dortmund, Germany
hendrik.fichtenberger@tu-dortmund.de
<https://orcid.org/0000-0003-3246-5323>
- Diego Figueira
CNRS, LaBRI, Université de Bordeaux
- Fedor V. Fomin
Department of Informatics, University of Bergen, Norway
Fedor.Fomin@uib.no
<https://orcid.org/0000-0003-1955-4612>
- Michael A. Forbes
University of Illinois at Urbana-Champaign, USA
miforbes@illinois.edu
- Jacob Fox
Department of Mathematics, Stanford University, Stanford, CA 94305, USA
jacobfox@stanford.edu
- Cameron E. Freer
Borelian
- Cedric Freiburger
Hasso Plattner Institute, University of Potsdam, Potsdam, Germany
cedric.freiburger@student.hpi.de
- Roy Friedman
Technion, Haifa, Israel
roy@cs.technion.ac.il
- Tobias Friedrich
Hasso Plattner Institute, University of Potsdam, Potsdam, Germany
tobias.friedrich@hpi.de
- Martin Fränzle
Department of Computing Science, University of Oldenburg, Germany
martin.fraenzle@informatik.uni-oldenburg.de
- Hao Fu
Institute for Interdisciplinary Information Sciences, Tsinghua University, Beijing, China
fu-h13@mails.tsinghua.edu.cn
- Martin Gairing
Department of Computer Science, University of Liverpool, Liverpool, UK
gairing@liverpool.ac.uk
- Jakub Gajarský
Technical University Berlin, Germany
- Buddhima Gamlath
École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland
buddhima.gamlath@epfl.ch
- Moses Ganardi
Universität Siegen, Germany
ganardi@eti.uni-siegen.de
- Venkata Gandikota
Department of Computer Science, Johns Hopkins University, Baltimore, Maryland, USA
gv@jhu.edu
- Sumit Ganguly
Indian Institute of Technology, Kanpur, India
sganguly@cse.iitk.ac.in
- Shashwat Garg
Eindhoven University of Technology, Netherlands
s.garg@tue.nl
- Paweł Gawrychowski
Institute of Computer Science, University of Wrocław, Poland
gawry@cs.uni.wroc.pl
- Ofir Geri
Department of Computer Science, Stanford University, Stanford, CA, USA
ofirgeri@cs.stanford.edu
- Sumanta Ghosh
Department of Computer Science, IIT Kanpur, India
sumghosh@cse.iitk.ac.in
- Suprovat Ghoshal
Indian Institute of Science, Bangalore, India
suprovat@iisc.ac.in

Yiannis Giannakopoulos
Department of Mathematics, TU Munich,
Munich, Germany
Yiannis.Giannakopoulos@tum.de
<https://orcid.org/0000-0003-2382-1779>

Shay Golan
Bar Ilan University, Ramat Gan, Israel
golansh1@cs.biu.ac.il

Petr A. Golovach
Department of Informatics, University of
Bergen, Norway
Petr.Golovach@uib.no
<https://orcid.org/0000-0002-2619-2990>

Michael T. Goodrich
Dept. of Computer Science, Univ. of
California, Irvine, Irvine, CA 92697 USA
goodrich@uci.edu

Themis Gouleakis
CSAIL, MIT, Cambridge, MA, USA
tgoule@mit.edu

Daniel Graf
Department of Computer Science, ETH
Zürich, Switzerland
daniel.graf@inf.ethz.ch

Anael Grandjean
Laboratoire d'Algorithmique, Complexité et
Logique, Université Paris-Est Créteil, France
anael.grandjean@u-pec.fr

Petr Gregor
Department of Theoretical Computer
Science and Mathematical Logic, Charles
University, Prague, Czech Republic
gregor@ktiml.mff.cuni.cz

Elena Grigorescu
Department of Computer Science, Purdue
University, West Lafayette, Indiana, USA
elena-g@purdue.edu

Martin Grohe
RWTH Aachen University, Aachen, Germany
grohe@informatik.rwth-aachen.de
<https://orcid.org/0000-0002-0292-9142>

Ofer Grossman
EECS Department, MIT, Cambridge, MA,
USA
ofer.grossman@gmail.com

Yong Gu
Institute for Interdisciplinary Information
Sciences, Tsinghua University, Beijing, China
guyong12@mails.tsinghua.edu.cn

Heng Guo
School of Informatics, University of
Edinburgh, Informatics Forum, Edinburgh,
EH8 9AB, United Kingdom
hguo@inf.ed.ac.uk
<https://orcid.org/0000-0001-8199-5596>

Anupam Gupta
Carnegie Mellon University, Pittsburgh, USA
anupamg@cs.cmu.edu

Manoj Gupta
IIT Gandhinagar, Gandhinagar, India
gmanoj@iitgn.ac.in

Tom Gur
UC Berkeley, Berkeley, USA
tom.gur@berkeley.edu

Rohit Gurjar
California Institute of Technology, USA

Guru Guruganesh
Carnegie Mellon University, Pittsburgh, USA

Grzegorz Gutowski
Theoretical Computer Science Department,
Faculty of Mathematics and Computer
Science, Jagiellonian University, Kraków,
Poland
grzegorz.gutowski@uj.edu.pl
<https://orcid.org/0000-0003-3313-1237>

Bernd Gärtner
Department of Computer Science, ETH
Zürich, Switzerland
gaertner@inf.ethz.ch

Shahrazad Haddadan
Dipartimento di Informatica, Sapienza
University, Rome, Italy
shahrazad.haddadan@uniroma1.it
<https://orcid.org/0000-0002-7702-8250>

- Theophanis Hadjistasi
University of Connecticut, Storrs CT, USA
theo@uconn.edu
- Bernhard Haeupler
Computer Science Department, Carnegie Mellon University, Pittsburgh, PA, USA
haeupler@cs.cmu.edu
- MohammadTaghi Hajiaghayi
University of Maryland, College Park, MD 20742, USA
- Magnús M. Halldórsson
School of Computer Science, Reykjavik University, Iceland
mmh@ru.is
- Thomas Dueholm Hansen
Department of Computer Science, University of Copenhagen, Denmark
dueholm@di.ku.dk
- Sariel Har-Peled
Department of Computer Science, University of Illinois, Urbana, IL, USA
sariel@illinois.edu
- Tobias Harks
Universität Augsburg, Institut für Mathematik, Augsburg, Germany
tobias.harks@math.uni-augsburg.de
- Koyo Hayashi
Department of Mathematical Informatics, University of Tokyo, Tokyo 113-8656, Japan
koyo_hayashi@mist.i.u-tokyo.ac.jp
- Benjamin Hellouin de Menibus
Laboratoire de Recherche en Informatique, Université Paris-Sud, CNRS, CentraleSupélec, Université Paris-Saclay, France
hellouin@lri.fr
<https://orcid.org/0000-0001-5194-929X>
- Danny Hermelin
Ben-Gurion University of the Negev, Beer Sheva, Israel
hermelin@bgu.ac.il
- Niklas Hjuler
University of Copenhagen, Copenhagen, Denmark
niklashjuler@gmail.com
<https://orcid.org/0000-0002-0815-670X>
- Rani Hod
Department of Mathematics, Bar-Ilan University, Ramat Gan, Israel
rani.hod@math.biu.ac.il
- Martin Hofer
Goethe-Universität Frankfurt am Main, Institut für Informatik, Frankfurt am Main, Germany
mhofer@cs.uni-frankfurt.de
- Piotr Hofman
University of Warsaw, Poland
<https://orcid.org/0000-0001-9866-3723>
- Jacob Holm
University of Copenhagen, Copenhagen, Denmark
jaho@di.ku.dk
<https://orcid.org/0000-0001-6997-9251>
- Yinon Horesh
Technion - Israel Institute of Technology, Haifa, Israel
ynon980@gmail.com
- Mathieu Hoyrup
Université de Lorraine, CNRS, Inria, LORIA, F-54000 Nancy, France
mathieu.hoyrup@inria.fr
- Justin Hsu
University College London, London, UK
- Sangxia Huang
Sony Mobile Communications, Lund, Sweden
huang.sangxia@gmail.com
- Zhiyi Huang
Department of Computer Science, The University of Hong Kong, Hong Kong
zhiyi@cs.hku.hk
- Anja Huber
Universität Augsburg, Institut für Mathematik, Augsburg, Germany
anja.huber@math.uni-augsburg.de

Pavel Hubáček
Computer Science Institute, Charles
University, Prague, Czech Republic
hubacek@iuuk.mff.cuni.cz

Danny Hucke
Universität Siegen, Germany
hucke@eti.uni-siegen.de

Christoph Hunkenschroder
EPFL, 1015 Lausanne, Switzerland
christoph.hunkenschroder@epfl.ch

Russell Impagliazzo
Department of Computer Science, University
of California San Diego, La Jolla, CA, USA
russell@cs.ucsd.edu

Piotr Indyk
Department of Computer Science, MIT,
Cambridge, MA, USA
indyk@mit.edu

Davis Issac
Max Planck Institute for Informatics,
Saarland Informatics Campus, Germany
dissac@mpi-inf.mpg.de
<https://orcid.org/0000-0001-5559-7471>

Abhishek Jain
Johns Hopkins University
abhishek@cs.jhu.edu

Jisu Jeong
Department of Mathematical Sciences,
KAIST, Daejeon, Korea
jisujeong89@gmail.com

Mark Jerrum
School of Mathematical Sciences, Queen
Mary, University of London, Mile End Road,
London, E1 4NS, United Kingdom
m.jerrum@qmul.ac.uk
<https://orcid.org/0000-0003-0863-7279>

Timothy Johnson
Dept. of Computer Science, Univ. of
California, Irvine, Irvine, CA 92697 USA
tujohnso@uci.edu

Marcin Jurdziński
University of Warwick, Coventry, UK
Marcin.Jurdzinski@warwick.ac.uk

Sven Jäger
Institut für Mathematik, Technische
Universität Berlin, Germany
jaeger@math.tu-berlin.de

Daniel M. Kane
Department of Computer Science and
Engineering/Department of Mathematics,
University of California, San Diego
dakane@ucsd.edu
<https://orcid.org/0000-0002-5884-3487>

Iyad Kanj
School of Computing, DePaul University,
Chicago, USA
ikanj@cs.depaul.edu

Haim Kaplan
School of Computer Science, Tel Aviv
University, Tel Aviv 69978, Israel
haimk@tau.ac.il

Adam Karczmarz
University of Warsaw, Poland
a.karczmarz@mimuw.edu.pl

Matthew J. Katz
Department of Computer Science,
Ben-Gurion University of the Negev,
Beer-Sheva 84105, Israel
matya@cs.bgu.ac.il

Maximilian Katzmann
Hasso Plattner Institute, University of
Potsdam, Potsdam, Germany
maximilian.katzmann@hpi.de

Ken-ichi Kawarabayashi
National Institute of Informatics, 2-1-2
Hitotsubashi, Chiyoda-ku, Tokyo 101-8430,
Japan
k_keniti@nii.ac.jp
<https://orcid.org/0000-0001-6056-4287>

Nathan Keller
Department of Mathematics, Bar-Ilan
University, Ramat Gan, Israel
nkeller@math.biu.ac.il

Thomas Kesselheim
University of Bonn, Institute of Computer
Science, Bonn, Germany
thomas.kesselheim@uni-bonn.de

Stefan Kiefer
University of Oxford, United Kingdom

David H. K. Kim
Computer Science Department, University of
Chicago, 1100 East 58th Street, Chicago,
Illinois 60637, USA
hongk@cs.uchicago.edu

Eun Jung Kim
Université Paris-Dauphine, PSL Research
University, CNRS, Paris, France
eun-jung.kim@dauphine.fr

Michael P. Kim
Department of Computer Science, Stanford
University, Stanford, CA, USA
mpk@cs.stanford.edu

Kim-Manuel Klein
EPFL, 1015 Lausanne, Switzerland
kim-manuel.klein@epfl.ch

Ines Klimann
Univ Paris Diderot, Sorbonne Paris Cité,
IRIF, UMR 8243 CNRS, F-75013 Paris,
France
klimann@irif.fr

Max Klimm
School of Business and Economics, HU
Berlin, Spandauer Str. 1, 10099 Berlin,
Germany
max.klimm@hu-berlin.de
<https://orcid.org/0000-0002-9061-2267>

Sang-Ki Ko
Korea Electronics Technology Institute,
South Korea
sangkiko@keti.re.kr

Bojana Kodric
MPI for Informatics and Saarland University,
Saarbrücken, Germany
bojana@mpi-inf.mpg.de

Zhuan Khye Koh
Department of Combinatorics and
Optimization, University of Waterloo,
Waterloo, Canada
zkkoh@uwaterloo.ca

Alexandra Kolla
Department of Computer Science, University
of Colorado at Boulder
alexandra.kolla@colorado.edu

Tsvi Kopelowitz
Bar Ilan University, Ramat Gan, Israel
kopelot@gmail.com

Guy Kortsarz
Rutgers University, Camden, NJ, USA
guyk@camden.rutgers.edu

Martin Koutecký
Technion - Israel Institute of Technology,
Haifa, Israel, and , Charles University,
Prague, Czech Republic
koutecky@technion.ac.il
<https://orcid.org/0000-0002-7846-0053>

Ioannis Koutis
Department of Computer Science, New
Jersey Institute of Technology
ioannis.koutis@njit.edu

Dariusz R. Kowalski
Computer Science Department, University of
Liverpool, Liverpool, UK
D.Kowalski@liverpool.ac.uk

Jakub Kozik
Theoretical Computer Science Department,
Faculty of Mathematics and Computer
Science, Jagiellonian University, Kraków,
Poland
jakub.kozik@uj.edu.pl

Stephan Kreutzer
Technical University Berlin
stephan.kreutzer@tu-berlin.de

Karel Král
Computer Science Institute, Charles
University, Prague, Czech Republic
kralka@iuuk.mff.cuni.cz

Amit Kumar
IIT Delhi, New Delhi, India

Ananya Kumar
Carnegie Mellon University, Pittsburgh,
United States
skywalker94@gmail.com

- Orna Kupferman
School of Computer Science and Engineering,
The Hebrew University, Israel
- Dietrich Kuske
Technische Universität Ilmenau, Germany
dietrich.kuske@tu-ilmenau.de
- William Kuszmaul
Department of Computer Science, Stanford
University, Stanford, CA, USA
kuszmaul@cs.stanford.edu
- Karim Labib
Department of Computer Science, ETH
Zürich, Switzerland
labibk@student.ethz.ch
- Anissa Lamani
Laboratoire MIS & Université de Picardie
Jules Verne, Amiens, France
anissa.lamani@u-picardie.fr
- Michael Lampis
Université Paris-Dauphine, PSL Research
University, CNRS, UMR 7243 , LAMSADE,
75016, Paris, France
michail.lampis@dauphine.fr
- Gad M. Landau
University of Haifa, Israel
landau@cs.haifa.ac.il
- Harry Lang
Johns Hopkins University, Baltimore, United
States
hlang8@math.jhu.edu
- Sławomir Lasota
University of Warsaw
sl@mimuw.edu.pl
<https://orcid.org/0000-0001-8674-4470>
- Ranko Lazić
University of Warwick, Coventry, UK
R.S.Lazic@warwick.ac.uk
- Christoph Lenzen
Max Planck Institute for Informatics,
Saarbrücken, Germany
clenzen@mpi-inf.mpg.de
- Jérôme Leroux
Univ.Bordeaux, CNRS, Bordeaux-INP,
Talence, France
jerome.leroux@labri.fr
- Reut Levi
Weizmann Institute of Science, Rehovot,
Israel
reut.levi@weizmann.ac.il
<https://orcid.org/0000-0003-3167-1766>
- Asaf Levin
Technion - Israel Institute of Technology,
Haifa, Israel
levinas@ie.technion.ac.il
- Bo Li
Department of Computer Science, Stony
Brook University, Stony Brook, NY 11794,
USA
boli2@cs.stonybrook.edu
- Jason Li
Carnegie Mellon University
- Jian Li
Institute for Interdisciplinary Information
Sciences, Tsinghua University, Beijing, China
Correspondingauthorlijian83@mail.
tsinghua.edu.cn
- Yingkai Li
Department of Computer Science, Stony
Brook University, Stony Brook, NY 11794,
USA
yingkli@cs.stonybrook.edu
- Vahid Liaghat
Facebook, Building 25, 190 Jefferson Dr,
Menlo Park, CA 94025, USA
- Nutan Limaye
Department of CSE, IIT Bombay, Mumbai,
India
nutan@cse.iitb.ac.in
- Sixue Liu
Department of Computer Science, Princeton
University , 35 Olden Street, Princeton, NJ
08540, USA
sixuel@cs.princeton.edu

Yang P. Liu
MIT, Cambridge, MA
yangpatil@gmail.com

Markus Lohrey
Universität Siegen, Germany
lohrey@eti.uni-siegen.de

Daniel Lokshtanov
Department of Informatics, University of
Bergen, Norway
daniello@uib.no

Anand Louis
Indian Institute of Science, Bangalore, India
anandl@iisc.ac.in

Shachar Lovett
Department of Computer Science and
Engineering, University of California, San
Diego
slovett@cs.ucsd.edu
<https://orcid.org/0000-0003-4552-1443>

Pinyan Lu
Institute for Theoretical Computer Science,
Shanghai University of Finance and
Economics, Shanghai 200433, China
lu.pinyan@mail.shufe.edu.cn

Anna Lubiw
School of Computer Science, University of
Waterloo, Canada
alubiw@uwaterloo.ca

Anna Lysyanskaya
Computer Science Department, Brown
University, Providence, RI 02912 USA
anna@cs.brown.edu

Kaifeng Lyu
Institute for Interdisciplinary Information
Sciences, Tsinghua University, Beijing, China
lkf15@mails.tsinghua.edu.cn

Vivek Madan
Department of Computer Science, University
of Illinois, Urbana-Champaign
vmadan2@illinois.edu

Sepideh Mahabadi
Data Science Institute, Columbia University,
New York, NY, USA
mahabadi@mit.edu

Frederik Mallmann-Trenn
CSAIL, MIT, US
mallmann@mit.edu

Nil Mamano
University of California, Irvine, U.S
nmamano@uci.edu

Florin Manea
Department of Computer Science, Kiel
University, D-24098 Kiel, Germany
flm@zs.uni-kiel.de

Pasin Manurangsi
University of California, Berkeley, USA
pasin@berkeley.edu

Yuchen Mao
Department of Computer Science and
Engineering, HKUST, Hong Kong
ymaoad@cse.ust.hk
<https://orcid.org/0000-0002-1075-344X>

Liran Markin
University of Haifa, Israel
liran.markin@gmail.com

Filip Mazowiecki
Université de Bordeaux, Bordeaux, France
filip.mazowiecki@u-bordeaux.fr

Saeed Mehrabi
School of Computer Science, Carleton
University, Ottawa, Canada
saeed.mehrabi@carleton.ca

Ruta Mehta
University of Illinois Urbana-Champaign,
Champaign, USA
rutameht@illinois.edu

George B. Mertzios
Department of Computer Science, Durham
University, UK
George.Mertzios@durham.ac.uk
<https://orcid.org/0000-0001-7182-585X>

Daniele Micciancio
Department of Computer Science and
Engineering, University of California - San
Diego, CA, USA
daniele@cs.ucsd.edu

Vahab Mirrokni
Google Research, New York

Pradipta Mitra
Google Research, New York, USA
ppmitra@gmail.com

Matthias Mnich
Universität Bonn, Germany, and Maastricht
University, The Netherlands
mmnich@uni-bonn.de
<https://orcid.org/0000-0002-4721-5354>

Sidhanth Mohanty
Computer Science Department, Carnegie
Mellon University, Pittsburgh, PA, USA
sidhanth@cmu.edu

Marco Molinaro
PUC-Rio, Rio de Janeiro, Brazil
mmolinaro@inf.puc-rio.br

Fabrizio Montecchiani
Department of Engineering, University of
Perugia, Perugia, Italy
fabrizio.montecchiani@unipg.it

Felix Montenegro-Retana
Hasso Plattner Institute, University of
Potsdam, Potsdam, Germany
felix.montenegro-retana@student.hpi.
de

Shay Moran
Institute for Advanced Study, Princeton
shaymoran@ias.edu
<https://orcid.org/0000-0002-8662-2737>

Pat Morin
School of Computer Science, Carleton
University, Ottawa, Canada
morin@scs.carleton.ca

Hagar Mosaad
Department of Computer Science and
Engineering, German University in Cairo,
Egypt
hagar.omar@student.guc.edu.eg

Luca Moscardelli
Department of Economic Studies, University
of Chieti-Pescara, Pescara, Italy
luca.moscardelli@unich.it

Miguel A. Mosteiro
Computer Science Department, Pace
University, New York, NY, USA
mmosteiro@pace.edu

Anish Mukherjee
Chennai Mathematical Institute, Chennai,
India
anish@cmi.ac.in

Cameron Musco
CSAIL, MIT, US
cnmusco@mit.edu

Christopher Musco
CSAIL, MIT, US
cpmusco@mit.edu

Torsten Mütze
Institut für Mathematik, Technische
Universität Berlin, Germany
muetze@math.tu-berlin.de

Hiroshi Nagamochi
Department of Applied Mathematics and
Physics, Graduate School of Informatics,
Kyoto University, Japan
nag@amp.i.kyoto-u.ac.jp

Vasileios Nakos
Harvard University, Cambridge, USA
vasileiosnakos@g.harvard.edu

Maryam Negahbani
Department of Computer Science,
Dartmouth College, 9 Maynard St, Hanover,
NH, USA
maryam@cs.dartmouth.edu

Yakov Nekrich
Cheriton School of Computer Science,
University of Waterloo, Canada
yakov.nekrich@googlemail.com

Daniel Neuen
RWTH Aachen University, Aachen, Germany
neuen@informatik.rwth-aachen.de

Jaroslav Nešetřil
Computer Science Institute, Charles
University, Prague, Czech Republic
nesetril@iuuk.mff.cuni.cz

- Rachit Nimavat
Toyota Technological Institute at Chicago,
6045 S. Kenwood Ave., Chicago, Illinois
60637, USA
nimavat@ttic.edu
- Chinmay Nirkhe
Electrical Engineering and Computer
Sciences, University of California, Berkeley ,
387 Soda Hall Berkeley, CA 94720, U.S.A
nirkhe@cs.berkeley.edu
- Reino Niskanen
Department of Computer Science, University
of Liverpool, UK
r.niskanen@liverpool.ac.uk
- Dirk Nowotka
Department of Computer Science, Kiel
University, D-24098 Kiel, Germany
dn@zs.uni-kiel.de
- Marc Noy
Universitat Politècnica de Catalunya,
Barcelona, marc.noy@upc.edu
- Krzysztof Onak
IBM Research, TJ Watson Research Center,
Yorktown Heights, New York, USA
- Shmuel Onn
Technion - Israel Institute of Technology,
Haifa, Israel
onn@ie.technion.ac.il
- Patrice Ossona de Mendez
CAMS (CNRS, UMR 8557), Paris, France
- Rafail Ostrovsky
Department of Computer Science, University
of California Los Angeles, USA
rafail@cs.ucla.edu
- Joël Ouaknine
Max Planck Institute for Software Systems,
Germany & , Department of Computer
Science, Oxford University, UK
joel@mpi-sws.org
- Sang-il Oum
Department of Mathematical Sciences,
KAIST, Daejeon, Korea
sangil@kaist.edu
- Katarzyna Paluch
Wroclaw University, Poland
abraka@cs.uni.wroc.pl
<https://orcid.org/0000-0002-7504-6340>
- Fahad Panolan
Department of Informatics, University of
Bergen, Norway
Fahad.Panolan@uib.no
<https://orcid.org/0000-0001-6213-8687>
- Charles Paperman
Université de Lille
- Merav Parter
Weizmann IS, Rehovot, Israel
merav.parter@weizmann.ac.il
- Sarvar Patel
Google LLC, Mountain View, USA
sarvar@google.com
- Boaz Patt-Shamir
Tel Aviv University, Tel Aviv, Israel
boaz@tau.ac.il
- John Peebles
CSAIL, MIT, Cambridge, MA, USA
jpeebles@mit.edu
- Giuseppe Persiano
Google LLC, Mountain View, USA and
Università di Salerno, Salerno, Italy
giuper@gmail.com
- Michał Pilipczuk
University of Warsaw, Warsaw, Poland
- Thomas Place
LaBRI, University of Bordeaux and IUF,
France
- Ely Porat
Bar Ilan University, Ramat Gan, Israel
porately@cs.biu.ac.il
- Igor Potapov
Department of Computer Science, University
of Liverpool, UK
potapov@liverpool.ac.uk
- Manoj Prabhakaran
Indian Institute of Technology Bombay
mp@cse.iitb.ac.in

Eric Price
UT Austin, Austin, TX, USA
ecprice@cs.utexas.edu

Gabriele Puppis
CNRS, LaBRI, Université de Bordeaux

Guillermo A. Pérez
Université libre de Bruxelles, Brussels,
Belgium
gperezme@ulb.ac.be
<https://orcid.org/0000-0002-1200-4952>

Yuval Rabani
The Rachel and Selim Benin School of
Computer Science and Engineering, The
Hebrew University of Jerusalem, Israel
yrabani@cs.huji.ac.il

Saladi Rahul
Dept. of Computer Science, University of
Illinois at Urbana-Champaign, USA
saladi@uiuc.edu

M. S. Ramanujan
Algorithms and Complexity Group, TU
Wien, Austria
ramanujan@ac.tuwien.ac.at

M. S. Ramanujan
University of Warwick, United Kingdom
R.Maadapuzhi-Sridharan@warwick.ac.uk

Sofya Raskhodnikova
Boston University, Boston, USA
sofya@bu.edu

Mikhail Raskin
LaBRI, University of Bordeaux, 351, cours
de la Libération F-33405 Talence cedex,
France
raskin@mccme.ru
<https://orcid.org/0000-0002-6660-5673>

Gaurav Rattan
RWTH Aachen University, Aachen, Germany
grohe@informatik.rwth-aachen.de
<https://orcid.org/0000-0002-5095-860X>

Alexander Ravsky
Pidstryhach Institute for Applied Problems
of Mechanics and Mathematics, National
Academy of Science of Ukraine, Lviv,
Ukraine
oravsky@mail.ru

Felix Reidl
Royal Holloway, University of London,
TW20 0EX, UK
Felix.Reidl@rhul.ac.uk

Hanlin Ren
Institute for Interdisciplinary Information
Sciences, Tsinghua University, China
rh116@mails.tsinghua.edu.cn

Michael Riabzev
Technion - Israel Institute of Technology,
Haifa, Israel
riabzevmichael@gmail.com

Sören Riechers
Paderborn University, Paderborn, Germany

Andrei Romashchenko
LIRMM, Univ Montpellier, CNRS,
Montpellier, France; on leave from IITP RAS
andrei.romashchenko@lirmm.fr

Eyal Ronen
Computer Science Department, The
Weizmann Institute, Rehovot, Israel
eyal.ronen@weizmann.ac.il

Eva Rotenberg
Technical University of Denmark, Lyngby,
Denmark
erot@dtu.dk
<https://orcid.org/0000-0001-5853-7909>

Ron D. Rothblum
MIT and Northeastern University,
Cambridge, MA
ronr@mit.edu

Tim Roughgarden
Department of Computer Science, Stanford
University, Stanford, CA 94305, USA

Daniel M. Roy
Univ. Toronto

Clemens Rösner
Department of Theoretical Computer
Science, University of Bonn, Germany
roesner@cs.uni-bonn.de

Aleksi Saarela
Department of Mathematics and Statistics,
University of Turku, 20014 Turku, Finland
amsaar@utu.fi
<https://orcid.org/0000-0002-6636-2317>

Manuel Sabin
Computer Science Division, University of
California Berkeley, Berkeley, CA, USA
msabin@berkeley.edu

Eden Saig
Department of Computer Science, Technion,
Haifa, Israel
edens@cs.technion.ac.il
<https://orcid.org/0000-0002-0810-2218>

Laura Sanità
Department of Combinatorics and
Optimization, University of Waterloo,
Waterloo, Canada
lsanita@uwaterloo.ca

Piotr Sankowski
Institute of Informatics, University of
Warsaw
sank@mimuw.edu.pl

Diego Nava Saucedo
Université de Lorraine, CNRS, Inria, LORIA,
F-54000 Nancy, France
diego.nava-saucedo@wanadoo.fr

Saket Saurabh
Institute of Mathematical Sciences, HBNI,
India and UMI ReLax
saket@imsc.res.in

Rahul Savani
University of Liverpool, UK
rahul.savani@liverpool.ac.uk

Joe Sawada
School of Computer Science, University of
Guelph, Canada
jsawada@uoguelph.ca

Nitin Saxena
Department of Computer Science, IIT
Kanpur, India
nitin@cse.iitk.ac.in

Marco Scarsini
Dipartimento di Economia e Finanza, LUISS,
Viale Romania 32, 00197 Roma, Italy
marco.scarsini@luiss.it
<https://orcid.org/0000-0001-6473-794X>

Baruch Schieber
IBM Research, TJ Watson Research Center,
Yorktown Heights, New York, USA

Andreas Schmid
Max Planck Institute for Informatics,
Saarbrücken, Germany
aschmid@mpi-inf.mpg.de

Stefan Schmid
University of Vienna, Austria
stefan_schmid@univie.ac.at

Jens M. Schmidt
Technische Universität Ilmenau, Ilmenau,
Germany
jens.schmidt@tu-ilmenau.de

Melanie Schmidt
Department of Theoretical Computer
Science, University of Bonn, Germany
melanieschmidt@uni-bonn.de

Alexander A. Schwarzmann
University of Connecticut, Storrs CT, USA
ass@uconn.edu

Nicole Schweikardt
Humboldt-Universität zu Berlin, Germany
schweikn@informatik.hu-berlin.de

Pascal Schweitzer
Technische Universität Kaiserslautern,
Kaiserslautern, Germany
schweitzer@cs.uni-kl.de

Saeed Seddighin
University of Maryland, College Park, MD
20742, USA

C. Seshadhri
Department of Computer Science, University
of California, Santa Cruz, CA 95064, USA

Amirbehshad Shahrasbi
Carnegie Mellon University, Pittsburgh, PA,
USA
shahrasbi@cs.cmu.edu

Jeffrey Shallit
School of Computer Science, University of
Waterloo, Canada
shallit@cs.uwaterloo.ca

Adi Shamir
Computer Science Department, The
Weizmann Institute, Rehovot, Israel
adi.shamir@weizmann.ac.il

Micha Sharir
School of Computer Science, Tel Aviv
University, Tel Aviv 69978, Israel
michas@tau.ac.il

Roohani Sharma
Institute of Mathematical Sciences, HBNI,
India and UMI ReLax
roohani@imsc.res.in

Xiaofei Shi
Carnegie Mellon University, Pittsburgh, USA
xiaofeis@andrew.cmu.edu

Philip Shilane
Dell EMC, Newtown, PA, USA
shilane@dell.com

Mahsa Shirmohammadi
CNRS & LIS, France
mahsa.shirmohammadi@lis-lab.fr

Sebastian Siebertz
University of Warsaw, Warsaw, Poland

Alexandra Silva
University College London, London, UK

Luis Fernando Schultz Xavier da Silveira
School of Computer Science and Electrical
Engineering, University of Ottawa, Ottawa,
Canada
schultz@ime.usp.br

Aditi Singh
IIT Gandhinagar, Gandhinagar, India
aditi.singh@iitgn.ac.in

Ali Kemal Sinop
TOBB University of Economics and
Technology, Ankara, Turkey
asinop@gmail.com

Piotr Skowron
University of Warsaw, Warsaw, Poland
p.skowron@mimuw.edu.pl

Michał Skrzypczak
University of Warsaw, Banacha 2, 02-097
Warsaw, Poland
mskrzypczak@mimuw.edu.pl
<https://orcid.org/0000-0002-9647-4993>

Veronika Slívová
Computer Science Institute, Charles
University, Prague, Czech Republic
slivova@iuuk.mff.cuni.cz

Shay Solomon
IBM Research, T. J. Watson Research
Center, Yorktown Heights, New York, USA

Tasuku Soma
The University of Tokyo, Tokyo, Japan
tasuku_soma@mist.i.u-tokyo.ac.jp
<https://orcid.org/0000-0001-9519-2487>

Manuel Sorge
Ben-Gurion University of the Negev, Beer
Sheva, Israel
sorge@post.bgu.ac.il

Krzysztof Sornat
University of Wrocław, Wrocław, Poland
krzysztof.sornat@cs.uni.wroc.pl

Jessica Sorrell
Department of Computer Science and
Engineering, University of California, San
Diego, CA, USA
jlsorrel@cs.ucsd.edu

Paul G. Spirakis
Department of Computer Science, University
of Liverpool, UK, Department of Computer
Engineering & Informatics, University of
Patras, Greece
P.Spirakis@liverpool.ac.uk
<https://orcid.org/0000-0001-5396-3749>

Joachim Spoerhase
Lehrstuhl für Informatik I, Universität
Würzburg, Germany and Institute of
Computer Science, University of Wrocław,
Poland
joachim.spoerhase@uni-wuerzburg
<https://orcid.org/0000-0002-2601-6452>

Srikanth Srinivasan
Department of Mathematics, IIT Bombay,
Mumbai, India
srikanth@math.iitb.ac.in

Sam Staton
Department of Computer Science, University
of Oxford, Oxford OX1 3QD UK
sam.staton@cs.ox.ac.uk

Cliff Stein
Columbia University, New York, USA

Dario Stein
Univ. Oxford

Damian Straszak
École Polytechnique Fédérale de Lausanne
(EPFL), Switzerland

Don M. Stull
Université de Lorraine, CNRS, Inria, LORIA,
F-54000 Nancy, France
donald.stull@inria.fr

Madhu Sudan
Harvard University, Cambridge, MA, USA
madhu@cs.harvard.edu

Wing-Kin Sung
National University of Singapore, Singapore
ksung@comp.nus.edu.sg

Manuel Surek
Universität Augsburg, Institut für
Mathematik, Augsburg, Germany
manuel.surek@math.uni-augsburg.de

Ola Svensson
École Polytechnique Fédérale de Lausanne,
Lausanne, Switzerland
ola.svensson@epfl.ch

Mani Swaminathan
Department of Computing Science,
University of Oldenburg, Germany
mani.swaminathan@informatik.
uni-oldenburg.de

Chaitanya Swamy
Dept. of Combinatorics and Optimization,
Univ. Waterloo, Waterloo, ON N2L 3G1,
Canada
cswamy@uwaterloo.ca

Géraud Sénizergues
LABRI, Bordeaux, France
geraud.senizergues@u-bordeaux.fr

Zhihao Gavin Tang
Department of Computer Science, The
University of Hong Kong, Hong Kong
zhtang@cs.hku.hk

Marianne Thieffry
Hasso Plattner Institute, University of
Potsdam, Potsdam, Germany
marianne.thieffry@student.hpi.de

Thomas Thierauf
Aalen University, Germany

Mikkel Thorup
BARC, University of Copenhagen,
Universitetsparken 1, Copenhagen, Denmark
mikkel2thorup@gmail.com
<https://orcid.org/0000-0001-5237-1709>

Tigran Tonoyan
School of Computer Science, Reykjavik
University, Iceland
ttonoyan@gmail.com

Szymon Toruńczyk
University of Warsaw, Warsaw, Poland

Konstantinos Tsakalidis
Dept. of Computer and Information Science,
Tandon School of Engineering, New York
University, USA
kt79@nyu.edu

Eli Upfal
Computer Science Department, Brown
University, Providence, RI 02912 USA
eli@cs.brown.edu

Przemysław Uznański
Department of Computer Science, ETH
Zürich, Switzerland
przemyslaw.uznanski@inf.ethz.ch

Pascal Vanier
Laboratoire d'Algorithmique, Complexité et
Logique, Université Paris-Est Créteil, France
pascal.vanier@lacl.fr

Gal Vardi
School of Computer Science and Engineering,
The Hebrew University, Israel

Shai Vardi
California Institute of Technology, Pasadena,
CA, USA
svardi@caltech.edu

Nithin Varma
Boston University, Boston, USA
nvarma@bu.edu

Yadu Vasudev
Indian Institute of Technology Madras,
Chennai, India
yadu@cse.iitm.ac.in
<https://orcid.org/0000-0001-7918-7194>

Umesh Vazirani
Electrical Engineering and Computer
Sciences, University of California, Berkeley ,
387 Soda Hall Berkeley, CA 94720, U.S.A
vazirani@cs.berkeley.edu

Rakesh Venkat
Hebrew University of Jerusalem, Israel
rakesh@cs.huji.ac.il

Suresh Venkatasubramanian
School of Computing, University of Utah,
USA
suresh@cs.utah.edu

Cosimo Vinci
Department of Information Engineering
Computer Science and Mathematics,
University of L'Aquila, L'Aquila, Italy -
Gran Sasso Science Institute, L'Aquila, Italy
cosimo.vinci@univaq.it

Emanuele Viola
Northeastern University
viola@ccs.neu.edu

Nisheeth K. Vishnoi
École Polytechnique Fédérale de Lausanne
(EPFL), Switzerland

Ellen Vitercik
Carnegie Mellon University, Pittsburgh, PA,
USA
vitercik@cs.cmu.edu

Nils Vortmeier
TU Dortmund University, Dortmund,
Germany
nils.vortmeier@tu-dortmund.de

Magnus Wahlström
Royal Holloway, University of London,
TW20 0EX, UK
Magnus.Wahlstrom@rhul.ac.uk

David Wajc
Carnegie Mellon University, Pittsburgh, USA

Stefan Walzer
Technische Universität Ilmenau, Germany
stefan.walzer@tu-ilmenau.de
<https://orcid.org/0000-0002-6477-0106>

Fan Wei
Department of Mathematics, Stanford
University, Stanford, CA 94305, USA

Oren Weimann
University of Haifa, Israel
oren@cs.haifa.ac.il

Nicole Wein
EECS, Massachusetts Institute of
Technology, Cambridge, MA 02139, USA

Armin Weiß
Universität Stuttgart, FMI, Germany
armin.weiss@fmi.uni-stuttgart.de

Daniel Wiebking
RWTH Aachen University, Aachen, Germany
wiebking@informatik.rwth-aachen.de

Sebastian Wiederrecht
TU Berlin, Germany
sebastian.wiederrecht@tu-berlin.de

- Kaja Wille
Institut für Mathematik, Technische
Universität Berlin, Germany
wille@math.tu-berlin.de
- Richard Ryan Williams
MIT EECS and CSAIL, 32 Vassar St,
Cambridge, MA 02139 USA
rrw@mit.edu
<https://orcid.org/0000-0003-2326-2233>
- Sarah Winter
RWTH Aachen University, Germany
winter@cs.rwth-aachen.de
- Felix Wolf
Technische Universität Darmstadt, Institute
TEMF, Graduate School of Excellence
Computational Engineering
wolf@gsc.tu-darmstadt.de
- David P. Woodruff
Carnegie Mellon University, School of
Computing, Pittsburg, USA
dwoodruf@cs.cmu.edu
- James Worrell
University of Oxford, Oxford, UK
James.Worrell@cs.ox.ac.uk
<https://orcid.org/0000-0001-8151-2443>
- Xiaowei Wu
Department of Computing, The Hong Kong
Polytechnic University, Hong Kong
wxw0711@gmail.com
- Maximilian Wötzel
BGSMATH and UPC Barcelona, Barcelona,
Spain
maximilian.wotzel@upc.edu
<https://orcid.org/0000-0001-7591-0998>
- Mingyu Xiao
School of Computer Science and Engineering,
University of Electronic Science and
Technology of China, Chengdu, China
myxiao@gmail.com
<https://orcid.org/0000-0002-1012-2373>
- Yuanhang Xie
Institute for Interdisciplinary Information
Sciences, Tsinghua University, Beijing, China
xieyh15@mails.tsinghua.edu.cn
- Pan Xu
Department of Computer Science, University
of Maryland, College Park, USA
panxu@cs.umd.edu
- Hongseok Yang
KAIST
- Lin F. Yang
Princeton University, Princeton, United
States
lin.yang@princeton.edu
- Harel Yedidsion
Ben-Gurion University of the Negev, Beer
Sheva, Israel
yedidsio@post.bgu.ac.il
- Kevin Yeo
Google LLC, Mountain View, USA
kwlyeo@google.com
- Yuichi Yoshida
National Institute of Informatics, Preferred
Infrastructure, Tokyo, Japan
yyoshida@nii.ac.jp
<https://orcid.org/0000-0001-8919-8479>
- Arman Yousefi
Department of Computer Science, University
of California Los Angeles, USA
armany@cs.ucla.edu
- Ching-Hua Yu
University of Illinois at Urbana-Champaign
cyu17@illinois.edu
- Henry Yuen
Electrical Engineering and Computer
Sciences, University of California, Berkeley ,
387 Soda Hall Berkeley, CA 94720, U.S.A
hyuen@cs.berkeley.edu
- Viktor Zamaraev
Department of Computer Science, Durham
University, UK
Viktor.Zamaraev@durham.ac.uk
<https://orcid.org/0000-0001-5755-4141>
- Meirav Zehavi
Department of Computer Science,
Ben-Gurion University, Israel
meiravze@bgu.ac.il

Marc Zeitoun
LaBRI, University of Bordeaux, France

Georg Zetsche
IRIF (Université Paris-Diderot & CNRS),
France
<https://orcid.org/0000-0002-6421-4388>

Thomas Zeume
TU Dortmund University, Dortmund,
Germany
thomas.zeume@tu-dortmund.de

Hongyang Zhang
Carnegie Mellon University, Pittsburgh, USA
hongyanz@cs.cmu.edu

Le Zhang
Institute for Interdisciplinary Information
Sciences, Tsinghua University, Beijing, China
le-zhang12@mails.tsinghua.edu.cn

Yuhao Zhang
Department of Computer Science, The
University of Hong Kong, Hong Kong
yhzhang2@cs.hku.hk

Zeyu Zhang
Johns Hopkins University, Baltimore, MD,
USA
zyzhang92@gmail.com

Samson Zhou
Department of Computer Science, Purdue
University, West Lafayette, Indiana, USA
samsonzhou@gmail.com

Marius Zimand
Department of Computer and Information
Sciences, Towson University, Baltimore, MD

