

Table of Contents – Part II

Invited Talks

On Multiple Keyword Sponsored Search Auctions with Budgets	1
<i>Riccardo Colini-Baldeschi, Monika Henzinger, Stefano Leonardi, and Martin Starnberger</i>	
A Theory Independent Curry-De Bruijn-Howard Correspondence	13
<i>Gilles Dowek</i>	
Standing on the Shoulders of a Giant: One Persons Experience of Turings Impact	16
<i>David Harel</i>	
Session Types and Distributed Computing	23
<i>Kohei Honda</i>	
Algorithms, Graph Theory, and the Solution of Laplacian Linear Equations	24
<i>Daniel A. Spielman</i>	
Randomized Mechanisms for Multi-unit Auctions (Extended Abstract)	27
<i>Berthold Vöcking</i>	

Track B – Logic Semantics, Automata and Theory of Programming

Algebraic Synchronization Trees and Processes	30
<i>Luca Aceto, Arnaud Carayol, Zoltán Ésik, and Anna Ingólfssdóttir</i>	
Streaming Tree Transducers	42
<i>Rajeev Alur and Loris D’Antoni</i>	
Causal Graph Dynamics	54
<i>Pablo Arrighi and Gilles Dowek</i>	
Degree Lower Bounds of Tower-Type for Approximating Formulas with Parity Quantifiers	67
<i>Albert Atserias and Anuj Dawar</i>	
Monadic Datalog Containment	79
<i>Michael Benedikt, Pierre Bourhis, and Pierre Senellart</i>	

A Machine-Independent Characterization of Timed Languages	92
<i>Mikołaj Bojańczyk and Sławomir Lasota</i>	
Regular Languages of Infinite Trees That Are Boolean Combinations of Open Sets	104
<i>Mikołaj Bojańczyk and Thomas Place</i>	
Toward Model Theory with Data Values	116
<i>Mikołaj Bojańczyk and Thomas Place</i>	
Robust Reachability in Timed Automata: A Game-Based Approach	128
<i>Patricia Bouyer, Nicolas Markey, and Ocan Sankur</i>	
Minimizing Expected Termination Time in One-Counter Markov Decision Processes	141
<i>Tomáš Brázdil, Antonín Kučera, Petr Novotný, and Dominik Wojtczak</i>	
Prefix Rewriting for Nested-Words and Collapsible Pushdown Automata	153
<i>Christopher Broadbent</i>	
A Saturation Method for Collapsible Pushdown Systems	165
<i>Chris Broadbent, Arnaud Carayol, Matthew Hague, and Olivier Serre</i>	
Regular Languages Are Church-Rosser Congruential	177
<i>Volker Diekert, Manfred Kufleitner, Klaus Reinhardt, and Tobias Walter</i>	
Time and Parallelizability Results for Parity Games with Bounded Treewidth	189
<i>John Fearnley and Sven Schewe</i>	
Nominal Completion for Rewrite Systems with Binders	201
<i>Maribel Fernández and Albert Rubio</i>	
Discrete Generalised Polynomial Functors	214
<i>Marcelo Fiore</i>	
Computing Game Metrics on Markov Decision Processes	227
<i>Hongfei Fu</i>	
Deciding First Order Properties of Matroids	239
<i>Tomáš Gavenčiak, Daniel Král, and Sang-il Oum</i>	
Pebble Games with Algebraic Rules	251
<i>Anuj Dawar and Bjarki Holm</i>	
Exponential Lower Bounds and Separation for Query Rewriting	263
<i>Stanislav Kikot, Roman Kontchakov, Vladimir Podolskii, and Michael Zakaryashev</i>	

Lattices of Logical Fragments over Words (Extended Abstract)	275
<i>Manfred Kufleitner and Alexander Lauser</i>	
On the Expressive Power of Cost Logics over Infinite Words	287
<i>Denis Kuperberg and Michael Vanden Boom</i>	
Coalgebraic Predicate Logic	299
<i>Tadeusz Litak, Dirk Pattinson, Katsuhiko Sano, and Lutz Schröder</i>	
Algorithmic Games for Full Ground References	312
<i>Andrzej Murawski and Nikos Tzevelekos</i>	
Two-Level Game Semantics, Intersection Types, and Recursion Schemes	325
<i>C.-H. Luke Ong and Takeshi Tsukada</i>	
An Automata-Theoretic Model of Idealized Algol (Extended Abstract)	337
<i>Uday S. Reddy and Brian P. Dunphy</i>	
Towards a Unified Theory of Operational and Axiomatic Semantics	351
<i>Grigore Roşu and Andrei Ştefănescu</i>	
Loader and Urzyczyn Are Logically Related	364
<i>Sylvain Salvati, Giulio Manzonetto, Mai Gehrke, and Henk Barendregt</i>	
Languages of Profinite Words and the Limitedness Problem	377
<i>Szymon Toruńczyk</i>	
The Complexity of Mean-Payoff Automaton Expression	390
<i>Yaron Velner</i>	

Track C – Foundations of Networked Computation

On the Locality of Some NP-Complete Problems	403
<i>Leonid Barenboim</i>	
Growing Half-Balls: Minimizing Storage and Communication Costs in CDNs	416
<i>Reuven Bar-Yehuda, Erez Kantor, Shay Kutten, and Dror Rawitz</i>	
Super-Fast Distributed Algorithms for Metric Facility Location	428
<i>Andrew Berns, James Hegeman, and Sriram V. Pemmaraju</i>	
Preventing Unraveling in Social Networks: The Anchored k -Core Problem	440
<i>Kshipra Bhawalkar, Jon Kleinberg, Kevin Lewi, Tim Roughgarden, and Aneesh Sharma</i>	

Edge Fault Tolerance on Sparse Networks	452
<i>Nishanth Chandran, Juan Garay, and Rafail Ostrovsky</i>	
Incentive Ratios of Fisher Markets	464
<i>Ning Chen, Xiaotie Deng, Hongyang Zhang, and Jie Zhang</i>	
Computational Complexity of Traffic Hijacking under BGP and S-BGP	476
<i>Marco Chiesa, Giuseppe Di Battista, Thomas Erlebach, and Maurizio Patrignani</i>	
Efficiency-Revenue Trade-Offs in Auctions	488
<i>Ilias Diakonikolas, Christos Papadimitriou, George Pierrakos, and Yaron Singer</i>	
Deterministic Network Exploration by Anonymous Silent Agents with Local Traffic Reports	500
<i>Yoann Dieudonné and Andrzej Pelc</i>	
A QPTAS for ϵ -Envy-Free Profit-Maximizing Pricing on Line Graphs...	513
<i>Khaled Elbassioni</i>	
Minimizing Rosenthal Potential in Multicast Games	525
<i>Fedor V. Fomin, Petr Golovach, Jesper Nederlof, and Michał Pilipczuk</i>	
Multiparty Proximity Testing with Dishonest Majority from Equality Testing	537
<i>Ran Gelles, Rafail Ostrovsky, and Kina Winoto</i>	
Anonymous Card Shuffling and Its Applications to Parallel Mixnets	549
<i>Michael T. Goodrich and Michael Mitzenmacher</i>	
Byzantine Agreement with a Rational Adversary	561
<i>Adam Groce, Jonathan Katz, Aishwarya Thiruvengadam, and Vassilis Zikas</i>	
Random Hyperbolic Graphs: Degree Sequence and Clustering Extended Abstract	573
<i>Luca Gugelmann, Konstantinos Panagiotou, and Ueli Peter</i>	
Topology-Aware VM Migration in Bandwidth Oversubscribed Datacenter Networks	586
<i>Navendu Jain, Ishai Menache, Joseph (Seffi) Naor, and F. Bruce Shepherd</i>	
Counting Arbitrary Subgraphs in Data Streams	598
<i>Daniel M. Kane, Kurt Mehlhorn, Thomas Sauerwald, and He Sun</i>	

<i>k</i> -Chordal Graphs: From Cops and Robber to Compact Routing via Treewidth	610
<i>Adrian Kosowski, Bi Li, Nicolas Nisse, and Karol Suchan</i>	
Contention Issues in Congestion Games	623
<i>Elias Koutsoupias and Katia Papakonstantinou</i>	
Online Mechanism Design (Randomized Rounding on the Fly)	636
<i>Piotr Krysta and Berthold Vöcking</i>	
Online Packing with Gradually Improving Capacity Estimations and Applications to Network Lifetime Maximization	648
<i>Marcel Ochel, Klaus Radke, and Berthold Vöcking</i>	
Distributed Algorithms for Network Diameter and Girth	660
<i>David Peleg, Liam Roditty, and Elad Tal</i>	
Author Index	673

Table of Contents – Part I

Track A – Algorithms, Complexity and Games

Unsatisfiability Bounds for Random CSPs from an Energetic Interpolation Method	1
<i>Dimitris Achlioptas and Ricardo Menchaca-Mendez</i>	
The NOF Multiparty Communication Complexity of Composed Functions	13
<i>Anil Ada, Arkadev Chattopadhyay, Omar Fawzi, and Phuong Nguyen</i>	
Quantum Strategies Are Better Than Classical in Almost Any XOR Game	25
<i>Andris Ambainis, Artūrs Bačkurs, Kaspars Balodis, Dmitrijs Kravčenko, Raitis Ozols, Juris Smotrovs, and Madars Virza</i>	
Efficient Submodular Function Maximization under Linear Packing Constraints	38
<i>Yossi Azar and Iftah Gamzu</i>	
Polynomial-Time Isomorphism Test for Groups with No Abelian Normal Subgroups (Extended Abstract)	51
<i>László Babai, Paolo Codenotti, and Youming Qiao</i>	
Clustering under Perturbation Resilience	63
<i>Maria Florina Balcan and Yingyu Liang</i>	
Secretary Problems with Convex Costs	75
<i>Siddharth Barman, Seeun Umboh, Shuchi Chawla, and David Malec</i>	
Nearly Simultaneously Resettable Black-Box Zero Knowledge	88
<i>Joshua Baron, Rafail Ostrovsky, and Ivan Visconti</i>	
Complexity of Complexity and Maximal Plain versus Prefix-Free Kolmogorov Complexity	100
<i>Bruno Bauwens</i>	
On Quadratic Programming with a Ratio Objective	109
<i>Aditya Bhaskara, Moses Charikar, Rajsekar Manokaran, and Aravindan Vijayaraghavan</i>	
De-amortizing Binary Search Trees	121
<i>Prosenjit Bose, Sébastien Collette, Rolf Fagerberg, and Stefan Langerman</i>	

Efficient Sampling Methods for Discrete Distributions	133
<i>Karl Bringmann and Konstantinos Panagiotou</i>	
Approximation Algorithms for Online Weighted Rank Function Maximization under Matroid Constraints	145
<i>Niv Buchbinder, Joseph (Seffi) Naor, R. Ravi, and Mohit Singh</i>	
Improved LP-Rounding Approximation Algorithm for k -level Uncapacitated Facility Location	157
<i>Jaroslav Byrka and Bartosz Rybicki</i>	
Testing Coverage Functions	170
<i>Deeparnab Chakrabarty and Zhiyi Huang</i>	
Sparse Fault-Tolerant Spanners for Doubling Metrics with Bounded Hop-Diameter or Degree	182
<i>T.-H. Hubert Chan, Mingfei Li, and Li Ning</i>	
A Dependent LP-Rounding Approach for the k -Median Problem	194
<i>Moses Charikar and Shi Li</i>	
Node-Weighted Network Design in Planar and Minor-Closed Families of Graphs	206
<i>Chandra Chekuri, Alina Ene, and Ali Vakilian</i>	
Computing the Visibility Polygon of an Island in a Polygonal Domain	218
<i>Danny Z. Chen and Haitao Wang</i>	
Directed Subset Feedback Vertex Set Is Fixed-Parameter Tractable	230
<i>Rajesh Chitnis, Marek Cygan, Mohammadtaghi Hajiaghayi, and Dániel Marx</i>	
Max-Cut Parameterized above the Edwards-Erdős Bound	242
<i>Robert Crowston, Mark Jones, and Matthias Mnich</i>	
Clique Cover and Graph Separation: New Incompressibility Results	254
<i>Marek Cygan, Stefan Kratsch, Marcin Pilipczuk, Michał Pilipczuk, and Magnus Wahlström</i>	
The Inverse Shapley Value Problem	266
<i>Anindya De, Ilias Diakonikolas, and Rocco Servedio</i>	
Zero-One Rounding of Singular Vectors	278
<i>Amit Deshpande, Ravindran Kannan, and Nikhil Srivastava</i>	
Label Cover Instances with Large Girth and the Hardness of Approximating Basic k -Spanner	290
<i>Michael Dinitz, Guy Kortsarz, and Ran Raz</i>	

Space-Constrained Interval Selection	302
<i>Yuval Emek, Magnús M. Halldórsson, and Adi Rosén</i>	
Polynomial Time Algorithms for Branching Markov Decision Processes and Probabilistic Min(Max) Polynomial Bellman Equations	314
<i>Kousha Etessami, Alistair Stewart, and Mihalis Yannakakis</i>	
Succinct Indices for Range Queries with Applications to Orthogonal Range Maxima	327
<i>Arash Farzan, J. Ian Munro, and Rajeev Raman</i>	
Universal Factor Graphs	339
<i>Uriel Feige and Shlomo Jozeph</i>	
Parameterized Approximation via Fidelity Preserving Transformations	351
<i>Michael R. Fellows, Ariel Kulik, Frances Rosamond, and Hadas Shachnai</i>	
Backdoors to Acyclic SAT	363
<i>Serge Gaspers and Stefan Szeider</i>	
Dominators, Directed Bipolar Orders, and Independent Spanning Trees	375
<i>Loukas Georgiadis and Robert E. Tarjan</i>	
Hardness of Approximation for Quantum Problems	387
<i>Sevag Gharibian and Julia Kempe</i>	
The Complexity of Computing the Sign of the Tutte Polynomial (and Consequent #P-hardness of Approximation)	399
<i>Leslie Ann Goldberg and Mark Jerrum</i>	
Stochastic Vehicle Routing with Recourse	411
<i>Inge Li Gørtz, Viswanath Nagarajan, and Rishi Saket</i>	
The Online Metric Matching Problem for Doubling Metrics	424
<i>Anupam Gupta and Kevin Lewi</i>	
Approximating Sparse Covering Integer Programs Online	436
<i>Anupam Gupta and Viswanath Nagarajan</i>	
Streaming and Communication Complexity of Clique Approximation ...	449
<i>Magnús M. Halldórsson, Xiaoming Sun, Mario Szegedy, and Chengu Wang</i>	
Distributed Private Heavy Hitters	461
<i>Justin Hsu, Sanjeev Khanna, and Aaron Roth</i>	

A Thirty Year Old Conjecture about Promise Problems	473
<i>Andrew Hughes, A. Pavan, Nathan Russell, and Alan Selman</i>	
Minimum Latency Submodular Cover	485
<i>Sungjin Im, Viswanath Nagarajan, and Ruben van der Zwaan</i>	
Constant-Time Algorithms for Sparsity Matroids	498
<i>Hiro Ito, Shin-Ichi Tanigawa, and Yuichi Yoshida</i>	
CRAM: Compressed Random Access Memory	510
<i>Jesper Jansson, Kunihiko Sadakane, and Wing-Kin Sung</i>	
Improving Quantum Query Complexity of Boolean Matrix Multiplication Using Graph Collision	522
<i>Stacey Jeffery, Robin Kothari, and Frédéric Magniez</i>	
Faster Fully Compressed Pattern Matching by Recompression	533
<i>Artur Jeż</i>	
NNS Lower Bounds via Metric Expansion for l_∞ and <i>EMD</i>	545
<i>Michael Kapralov and Rina Panigrahy</i>	
Quantum Adversary (Upper) Bound	557
<i>Shelby Kimmel</i>	
Solving PLANAR k -TERMINAL CUT in $O(n^{c\sqrt{k}})$ Time	569
<i>Philip N. Klein and Dániel Marx</i>	
Fixed-Parameter Tractability of Multicut in Directed Acyclic Graphs . . .	581
<i>Stefan Kratsch, Marcin Pilipczuk, Michał Pilipczuk, and Magnus Wahlström</i>	
Preserving Terminal Distances Using Minors	594
<i>Robert Krauthgamer and Tamar Zondiner</i>	
A Rounding by Sampling Approach to the Minimum Size k -Arc Connected Subgraph Problem	606
<i>Bundit Laekhanukit, Shayan Oveis Gharan, and Mohit Singh</i>	
Classical and Quantum Partition Bound and Detector Inefficiency	617
<i>Sophie Laplante, Virginie Lerays, and Jérémie Roland</i>	
Testing Similar Means	629
<i>Reut Levi, Dana Ron, and Ronitt Rubinfeld</i>	
The Parameterized Complexity of k -Edge Induced Subgraphs	641
<i>Bingkai Lin and Yijia Chen</i>	

Converting Online Algorithms to Local Computation Algorithms.....	653
<i>Yishay Mansour, Aviad Rubinstein, Shai Vardi, and Ning Xie</i>	
Assigning Sporadic Tasks to Unrelated Parallel Machines	665
<i>Alberto Marchetti-Spaccamela, Cyriel Rutten, Suzanne van der Ster, and Andreas Wiese</i>	
A Tight Lower Bound for Planar Multiway Cut with Fixed Number of Terminals	677
<i>Dániel Marx</i>	
The Power of Recourse for Online MST and TSP	689
<i>Nicole Megow, Martin Skutella, José Verschae, and Andreas Wiese</i>	
Geometry of Online Packing Linear Programs	701
<i>Marco Molinaro and R. Ravi</i>	
Self-assembly with Geometric Tiles	714
<i>Bin Fu, Matthew J. Patitz, Robert T. Schweller, and Robert Sheline</i>	
Quasi-polynomial Local Search for Restricted Max-Min Fair Allocation	726
<i>Lukas Polacek and Ola Svensson</i>	
Strictly-Black-Box Zero-Knowledge and Efficient Validation of Financial Transactions	738
<i>Michael O. Rabin, Yishay Mansour, S. Muthukrishnan, and Moti Yung</i>	
Parameterized Tractability of Multiway Cut with Parity Constraints ...	750
<i>Daniel Lokshtanov and M.S. Ramanujan</i>	
Set Cover Revisited: Hypergraph Cover with Hard Capacities.....	762
<i>Barna Saha and Samir Khuller</i>	
On the Limits of Sparsification	774
<i>Rahul Santhanam and Srikanth Srinivasan</i>	
Certifying 3-Connectivity in Linear Time	786
<i>Jens M. Schmidt</i>	
Epsilon-Net Method for Optimizations over Separable States	798
<i>Yaoyun Shi and Xiaodi Wu</i>	
Faster Algorithms for Privately Releasing Marginals	810
<i>Justin Thaler, Jonathan Ullman, and Salil Vadhan</i>	
Stochastic Matching with Commitment	822
<i>Kevin P. Costello, Prasad Tetali, and Pushkar Tripathi</i>	

*Rademacher-Sketch: A Dimensionality-Reducing Embedding for
Sum-Product Norms, with an Application to Earth-Mover Distance* 834
Elad Verbin and Qin Zhang

A Matrix Hyperbolic Cosine Algorithm and Applications 846
Anastasios Zouzias

Author Index 859