



HAL
open science

37th International Symposium on Theoretical Aspects of Computer Science (STACS 2020)

Christophe Paul, Markus Bläser

► **To cite this version:**

Christophe Paul, Markus Bläser. 37th International Symposium on Theoretical Aspects of Computer Science (STACS 2020). STACS 2020 - 37th International Symposium on Theoretical Aspects of Computer Science, 154, 2020, Leibniz International Proceedings in Informatics (LIPIcs), 978-3-95977-140-5. 10.4230/LIPIcs.STACS.2020.0 . lirmm-03027647

HAL Id: lirmm-03027647

<https://hal-lirmm.ccsd.cnrs.fr/lirmm-03027647>

Submitted on 30 Jun 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

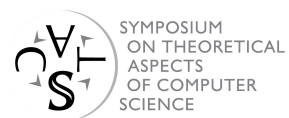
37th International Symposium on Theoretical Aspects of Computer Science

STACS 2020, March 10–13, 2020, Montpellier, France

Edited by

Christophe Paul

Markus Bläser



Editors

Christophe Paul 

CNRS, Université de Montpellier, France
christophe.paul@lirmm.fr

Markus Bläser

Universität des Saarlandes, Saarbrücken, Germany
mblaeser@cs.uni-saarland.de

ACM Classification 2012

Mathematics of computing → Combinatorics; Mathematics of computing → Graph theory; Theory of computation → Formal languages and automata theory; Theory of computation → Logic; Theory of computation → Design and analysis of algorithms; Theory of computation → Computational complexity and cryptography; Theory of computation → Models of computation

ISBN 978-3-95977-140-5

Published online and open access by

Schloss Dagstuhl – Leibniz-Zentrum für Informatik GmbH, Dagstuhl Publishing, Saarbrücken/Wadern, Germany. Online available at <https://www.dagstuhl.de/dagpub/978-3-95977-140-5>.

Publication date

March, 2020

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 <https://portal.dnb.de>.

License

This work is licensed under a Creative Commons Attribution 3.0 Unported license (CC-BY 3.0):
<https://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.STACS.2020.0

ISBN 978-3-95977-140-5

ISSN 1868-8969

<https://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)
- Christel Baier (TU Dresden)
- Mikolaj Bojanczyk (University of Warsaw)
- Roberto Di Cosmo (INRIA and University Paris Diderot)
- Javier Esparza (TU München)
- Meena Mahajan (Institute of Mathematical Sciences)
- Dieter van Melkebeek (University of Wisconsin-Madison)
- Anca Muscholl (University Bordeaux)
- Luke Ong (University of Oxford)
- Catuscia Palamidessi (INRIA)
- Thomas Schwentick (TU Dortmund)
- Raimund Seidel (Saarland University and Schloss Dagstuhl – Leibniz-Zentrum für Informatik)

ISSN 1868-8969

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

■ Contents

Preface	
<i>Christophe Paul and Markus Bläser</i>	0:ix–0:x
Conference organization	
.....	0:xi–0:xii

Invited Talk

Statistical Physics and Algorithms	
<i>Dana Randall</i>	1:1–1:6
Weisfeiler and Leman’s Unlikely Journey from Graph Isomorphism to Neural Networks	
<i>Martin Grohe</i>	2:1–2:1
Computability, Complexity and Programming with Ordinary Differential Equations	
<i>Olivier Bournez</i>	3:1–3:13

Tutorial

Graphical Models: Queries, Complexity, Algorithms	
<i>Martin C. Cooper, Simon de Givry, and Thomas Schiex</i>	4:1–4:22

Regular Paper

Inapproximability Results for Scheduling with Interval and Resource Restrictions	
<i>Marten Maack and Klaus Jansen</i>	5:1–5:18
An Automaton Group with PSPACE-Complete Word Problem	
<i>Jan Philipp Wächter and Armin Weiß</i>	6:1–6:17
A Trichotomy for Regular Trail Queries	
<i>Wim Martens, Matthias Niewerth, and Tina Trautner</i>	7:1–7:16
Descriptive Complexity on Non-Polish Spaces	
<i>Antonin Callard and Mathieu Hoyrup</i>	8:1–8:16
NP-Completeness, Proof Systems, and Disjoint NP-Pairs	
<i>Titus Dose and Christian Glaßer</i>	9:1–9:18
String Indexing with Compressed Patterns	
<i>Philip Bille, Inge Li Gørtz, and Teresa Anna Steiner</i>	10:1–10:13
An FPT Algorithm for Minimum Additive Spanner Problem	
<i>Yusuke Kobayashi</i>	11:1–11:16
New Bounds for Randomized List Update in the Paid Exchange Model	
<i>Susanne Albers and Maximilian Janke</i>	12:1–12:17



On Covering Segments with Unit Intervals <i>Dan Bergren, Eduard Eiben, Robert Ganian, and Iyad Kanj</i>	13:1–13:17
Decidability and Periodicity of Low Complexity Tilings <i>Jarkko Kari and Etienne Moutot</i>	14:1–14:12
The Tandem Duplication Distance Is NP-Hard <i>Manuel Lafond, Binhai Zhu, and Peng Zou</i>	15:1–15:15
Existential Length Universality <i>Paweł Gawrychowski, Martin Lange, Narad Rampersad, Jeffrey Shallit, and Marek Szymbura</i>	16:1–16:14
On the Termination of Flooding <i>Walter Hussak and Amitabh Trehan</i>	17:1–17:13
Generalised Pattern Matching Revisited <i>Bartłomiej Dudek, Paweł Gawrychowski, and Tatiana Starikovskaya</i>	18:1–18:18
Parameterized Pre-Coloring Extension and List Coloring Problems <i>Gregory Gutin, Diptapriyo Majumdar, Sebastian Ordyniak, and Magnus Wahlström</i>	19:1–19:18
Oracle Complexity Classes and Local Measurements on Physical Hamiltonians <i>Sevag Gharibian, Stephen Piddock, and Justin Yirka</i>	20:1–20:37
Secret Key Agreement from Correlated Data, with No Prior Information <i>Marius Zimand</i>	21:1–21:12
Using Statistical Encoding to Achieve Tree Succinctness Never Seen Before <i>Michał Gańczorz</i>	22:1–22:29
Quantum Distributed Algorithm for Triangle Finding in the CONGEST Model <i>Taisuke Izumi, François Le Gall, and Frédéric Magniez</i>	23:1–23:13
Lower Bounds for Arithmetic Circuits via the Hankel Matrix <i>Nathanaël Fijalkow, Guillaume Lagarde, Pierre Ohlmann, and Olivier Serre</i>	24:1–24:16
Solving Vertex Cover in Polynomial Time on Hyperbolic Random Graphs <i>Thomas Bläsius, Philipp Fischbeck, Tobias Friedrich, and Maximilian Katzmann</i> .	25:1–25:14
Domino Problem Under Horizontal Constraints <i>Nathalie Aubrun, Julien Esnay, and Mathieu Sablik</i>	26:1–26:15
Computing Maximum Matchings in Temporal Graphs <i>George B. Mertzios, Hendrik Molter, Rolf Niedermeier, Viktor Zamaraev, and Philipp Zschoche</i>	27:1–27:14
Tight Bounds for the Cover Times of Random Walks with Heterogeneous Step Lengths <i>Brieuc Guinard and Amos Korman</i>	28:1–28:14
Solving Connectivity Problems Parameterized by Treedepth in Single-Exponential Time and Polynomial Space <i>Falko Hegerfeld and Stefan Kratsch</i>	29:1–29:16
Non-Rectangular Convolutions and (Sub-)Cadences with Three Elements <i>Mitsuru Funakoshi and Julian Pape-Lange</i>	30:1–30:16

Maximum Matchings in Geometric Intersection Graphs <i>Édouard Bonnet, Sergio Cabello, and Wolfgang Mulzer</i>	31:1–31:17
Unambiguous Separators for Tropical Tree Automata <i>Thomas Colcombet and Sylvain Lombardy</i>	32:1–32:13
Asymptotic Quasi-Polynomial Time Approximation Scheme for Resource Minimization for Fire Containment <i>Mirmahdi Rahgoshay and Mohammad R. Salavatipour</i>	33:1–33:14
Streaming Complexity of Spanning Tree Computation <i>Yi-Jun Chang, Martin Farach-Colton, Tsan-Sheng Hsu, and Meng-Tsung Tsai</i> ...	34:1–34:19
Shortest Reconfiguration of Colorings Under Kempe Changes <i>Marthe Bonamy, Marc Heinrich, Takehiro Ito, Yusuke Kobayashi, Haruka Mizuta, Moritz Mühlenthaler, Akira Suzuki, and Kunihiko Wasa</i>	35:1–35:14
Elimination Distances, Blocking Sets, and Kernels for Vertex Cover <i>Eva-Maria C. Hols, Stefan Kratsch, and Astrid Pieterse</i>	36:1–36:14
Near-Optimal Complexity Bounds for Fragments of the Skolem Problem <i>S. Akshay, Nikhil Balaji, Aniket Murhekar, Rohith Varma, and Nikhil Vyas</i>	37:1–37:18
Efficient Parameterized Algorithms for Computing All-Pairs Shortest Paths <i>Stefan Kratsch and Florian Nelles</i>	38:1–38:15
Relational Width of First-Order Expansions of Homogeneous Graphs with Bounded Strict Width <i>Michał Wrona</i>	39:1–39:16
Succinct Population Protocols for Presburger Arithmetic <i>Michael Blondin, Javier Esparza, Blaise Genest, Martin Helfrich, and Stefan Jaax</i>	40:1–40:15
A Sub-Quadratic Algorithm for the Longest Common Increasing Subsequence Problem <i>Lech Duraj</i>	41:1–41:18
Fixed-Parameter Algorithms for Unsplittable Flow Cover <i>Andrés Cristi, Mathieu Mari, and Andreas Wiese</i>	42:1–42:17
Identifiability of Graphs with Small Color Classes by the Weisfeiler-Leman Algorithm <i>Frank Fuhlbrück, Johannes Köbler, and Oleg Verbitsky</i>	43:1–43:18
Better Approximations for General Caching and UFP-Cover Under Resource Augmentation <i>Andrés Cristi and Andreas Wiese</i>	44:1–44:14
Improved Bounds on Fourier Entropy and Min-Entropy <i>Srinivasan Arunachalam, Sourav Chakraborty, Michal Koucký, Nitin Saurabh, and Ronald de Wolf</i>	45:1–45:19
Information Distance Revisited <i>Bruno Bauwens</i>	46:1–46:14
On Computing Multilinear Polynomials Using Multi- r -ic Depth Four Circuits <i>Suryajith Chillara</i>	47:1–47:16

Observation and Distinction. Representing Information in Infinite Games <i>Dietmar Berwanger and Laurent Doyen</i>	48:1–48:17
How Fast Can You Escape a Compact Polytope? <i>Julian D’Costa, Engel Lefaucheur, Joël Ouaknine, and James Worrell</i>	49:1–49:11
The SDP Value for Random Two-Eigenvalue CSPs <i>Sidhanth Mohanty, Ryan O’Donnell, and Pedro Paredes</i>	50:1–50:45
Asymptotic Divergences and Strong Dichotomy <i>Xiang Huang, Jack H. Lutz, Elvira Mayordomo, and Donald M. Stull</i>	51:1–51:15
Perfect Resolution of Conflict-Free Colouring of Interval Hypergraphs <i>S. M. Dhannya and N. S. Narayanaswamy</i>	52:1–52:16
Constant-Time Dynamic $(\Delta + 1)$ -Coloring <i>Monika Henzinger and Pan Peng</i>	53:1–53:18
Cryptocurrency Mining Games with Economic Discount and Decreasing Rewards <i>Marcelo Arenas, Juan Reutter, Etienne Toussaint, Martín Ugarte, Francisco Vial, and Domagoj Vrgoč</i>	54:1–54:16
Randomness and Initial Segment Complexity for Probability Measures <i>André Nies and Frank Stephan</i>	55:1–55:14
Computing Shrub-Depth Decompositions <i>Jakub Gajarský and Stephan Kreutzer</i>	56:1–56:17
Typical Sequences Revisited – Computing Width Parameters of Graphs <i>Hans L. Bodlaender, Lars Jaffke, and Jan Arne Telle</i>	57:1–57:16
Grundy Coloring & Friends, Half-Graphs, Bicliques <i>Pierre Aboulker, Édouard Bonnet, Eun Jung Kim, and Florian Sikora</i>	58:1–58:18
Lower Bounds Against Sparse Symmetric Functions of ACC Circuits: Expanding the Reach of #SAT Algorithms <i>Nikhil Vyas and R. Ryan Williams</i>	59:1–59:17
Reversible Pebble Games and the Relation Between Tree-Like and General Resolution Space <i>Jacobo Torán and Florian Wörz</i>	60:1–60:18

■ Preface

The International Symposium on Theoretical Aspects of Computer Science (STACS) conference series is an internationally leading forum for original research on theoretical aspects of computer science. Typical areas are:

- algorithms and data structures, including: design of parallel, distributed, approximation, parameterized and randomized algorithms; analysis of algorithms and combinatorics of data structures; computational geometry, cryptography, algorithmic learning theory, algorithmic game theory;
- automata and formal languages, including: algebraic and categorical methods, coding theory; complexity and computability, including: computational and structural complexity theory, parameterized complexity, randomness in computation;
- logic in computer science, including: finite model theory, database theory, semantics, specification verification, rewriting and deduction;
- current challenges, for example: natural computing, quantum computing, mobile and net computing, computational social choice.

STACS is held alternately in France and in Germany. This year's conference (taking place March 10-13 in Montpellier) is the 37th in the series. Previous meetings took place in Paris (1984), Saarbrücken (1985), Orsay (1986), Passau (1987), Bordeaux (1988), Paderborn (1989), Rouen (1990), Hamburg (1991), Cachan (1992), Würzburg (1993), Caen (1994), München (1995), Grenoble (1996), Lübeck (1997), Paris (1998), Trier (1999), Lille (2000), Dresden (2001), Antibes (2002), Berlin (2003), Montpellier (2004), Stuttgart (2005), Marseille (2006), Aachen (2007), Bordeaux (2008), Freiburg (2009), Nancy (2010), Dortmund (2011), Paris (2012), Kiel (2013), Lyon (2014), München (2015), Orléans (2016), Hannover (2017), Caen (2018), Berlin (2019).

The interest in STACS has remained at a very high level over the past years. The STACS 2020 call for papers led to 242 submissions with authors from 43 countries. Each paper was assigned to three program committee members who, at their discretion, asked external reviewers for reports. For the sixth time within the STACS conference series, there was also a rebuttal period during which authors could submit remarks to the PC concerning the reviews of their papers. The committee selected 56 papers during a three-week electronic meeting held in November/December 2019. This means an acceptance rate of only 23%. As co-chairs of the program committee, we would like to sincerely thank all its members and the 448 external reviewers for their valuable work. In particular, there were intense and interesting discussions inside the PC committee. The overall very high quality of the submissions made the selection an extremely difficult task.

We would like to express our thanks to the three invited speakers: Dana Randal (Georgia Technical Institute, Atlanta, USA), Olivier Bournez (LIX, École Polytechnique, Palaiseau, France), and Martin Grohe (RWTH Aachen University, Germany). Since 2011, the conference program includes tutorials. This year, we are pleased to invite Thomas Schiex (INRAE, Toulouse, France) and Stéphan Thomassé (LIP, ENS Lyon, France) to the tutorial session.

Special thanks go to the local organizing committee for continuous help throughout the conference organization. In particular, we wish to thank the colleagues and student from the ALGCO, ECO and ESCAPE research groups for their help as well as Mégane Miquel and Virginie Fèche from LIRMM laboratory staff for her permanent organisation support.

Moreover, we thank Michael Wagner from the Dagstuhl/LIPIcs team for assisting us in the publication process and the final production of the proceedings. These proceedings



contain extended abstracts of the accepted contributions and abstracts of the invited talks and the tutorials. The authors retain their rights and make their work available under a Creative Commons license. The proceedings are published electronically by Schloss Dagstuhl – Leibniz-Center for Informatics within their LIPIcs series. Finally we would like to thank our sponsors for their financial supports: Occitanie Region District, Institut des Sciences de l'Information et leurs Interaction (INS2I) of CNRS; the University of Montpellier and the I-Site MUSE project; the LabEx NUMEV and the LIRMM Laboratory.

Montpellier and Saarbrücken, March 2020

Christophe Paul and Markus Bläser

■ Conference organization

Program committee

Spyros Angelopoulos	CNRS, Sorbonne Université, Paris, France
V. Arvind	The Institute of Mathematical Sciences (HBNI), Chennai, India
Sayan Bhattacharya	University of Warwick, United Kingdom
Laurent Bienvenu	CNRS, Université de Bordeaux, France
Markus Bläser	Saarland University, Saarbrücken, Germany, co-chair
Manuel Bodirsky	Technische Universität Dresden, Germany
Jop Briët	CWI, Amsterdam, Netherlands
Wojciech Czerwiński	University of Warsaw, Poland
Holger Dell	IT University of Copenhagen, Denmark
Faith Ellen	University of Toronto, Canada
Petr Golovach	Bergen University, Norway
John Hitchcock	University of Wyoming, USA
Christian Ikenmeyer	University of Liverpool, United Kingdom
Shunsuke Inenaga	Kyushu University, Fukuoka, Japan
Christian Konrad	University of Bristol, United Kingdom
Kasper Green Larsen	Aarhus University, Denmark
Ranko Lazic	University of Warwick, United Kingdom
Meena Mahajan	The Institute of Mathematical Sciences (HBNI), Chennai, India
Ulrich Meyer	Goethe Universität, Frankfurt am Main, Germany
Benjamin Monmege	Aix-Marseille Université, France
Christophe Paul	CNRS, Université de Montpellier, France, co-chair
Marcin Pilipczuk	University of Warsaw, Poland
Eva Rotenberg	Technical University of Denmark, Lingby, Denmark
Pierre Senellart	Ecole normale supérieure, Université PSL, France
Till Tantau	Universität zu Lübeck, Germany
Lidia Tendera	Uniwersytet Opolski, Poland
Corentin Travers	Université de Bordeaux, France
Alfredo Viola	Universidad de la República de Uruguay, Uruguay
Georg Zetsche	The Max Planck Institute for Software Systems (MPI-SWS), Kaiserslautern, Germany
Thomas Zeume	Technische Universität Dortmund, Germany
Martin Ziegler	KAIST, Daejeon, Republic of Korea
Standa Zivny	University of Oxford, United Kingdom

Steering committee

Thomas Colcombet	CNRS, Université Paris Diderot, France
Martin Dietzfelbinger	Technische Universität Ilmenau, Germany
Arnaud Durand	Université Paris Diderot, France
Christoph Dürr	CNRS, Sorbonne Université, co-chair, France
Henning Fernau	Universität Trier, Germany
Dietrich Kuske	Technische Universität Ilmenau, Germany
Arne Meier	Leibniz Universität Hannover, Germany
Rolf Niedermeier	Technische Universität Berlin, Germany
Natacha Portier	ENS Lyon, France
Gilles Schaeffer	CNRS, Ecole Polytechnique, Palaiseau, France
Thomas Schwentick	Technische Universität Dortmund, co-chair, Germany
Ioan Todinca	Université d'Orléans, France

Local organizing committee (LIRMM, Université de Montpellier, CNRS)

Marin Bougeret	Fabien Jacques	Andrei Romashchenko
Virginie Fèche	Hoang La	Ignasi Sau Valls
Daniel Goncalves	Romain Lebreton	Alexander Shen
Bruno Grenet	Mégane Miquel	Ilaria Zappatore
Emirhan Gürpınar	Christophe Paul (Chair)	
Lucas Isenmann	Alexandre Pinlou	

Sponsors

