

35th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms

AofA 2024, June 17–21, 2024, University of Bath, UK

Edited by

Cécile Mailler
Sebastian Wild



Editors

Cécile Mailler 

University of Bath, UK
c.mailler@bath.ac.uk

Sebastian Wild 

University of Liverpool, UK
wild@liverpool.ac.uk

ACM Classification 2012

Mathematics of computing; Mathematics of computing → Discrete mathematics; Mathematics of computing → Probability and statistics; Mathematics of computing → Information theory; Mathematics of computing → Mathematical analysis; Theory of computation → Generating random combinatorial structures; Theory of computation → Random walks and Markov chains

ISBN 978-3-95977-329-4

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/978-3-95977-329-4>.

Publication date

July, 2024

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>.

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Digital Object Identifier: 10.4230/LIPICs.AofA.2024.0

ISBN 978-3-95977-329-4

ISSN 1868-8969

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

LIPICs – Leibniz International Proceedings in Informatics

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Dedicated to the memory of Philippe Flajolet.

■ Contents

Preface	
<i>Cécile Mailler and Sebastian Wild</i>	0:ix–0:x
AofA 2024 Program Committee	
.....	0:xi
AofA Steering Committee	
.....	0:xi

Regular Papers

Fringe Trees for Random Trees with Given Vertex Degrees	
<i>Gabriel Berzunza Ojeda, Cecilia Holmgren, and Svante Janson</i>	1:1–1:13
Enumeration and Succinct Encoding of AVL Trees	
<i>Jeremy Chizewer, Stephen Melczer, J. Ian Munro, and Ava Pun</i>	2:1–2:12
Maximal Number of Subword Occurrences in a Word	
<i>Wenjie Fang</i>	3:1–3:12
Sparsification of Phylogenetic Covariance Matrices of k -Regular Trees	
<i>Sean Svihla and Manuel E. Lladser</i>	4:1–4:17
Bit-Array-Based Alternatives to HyperLogLog	
<i>Svante Janson, Jérémie Lumbroso, and Robert Sedgewick</i>	5:1–5:19
Phase Transition for Tree-Rooted Maps	
<i>Marie Albenque, Éric Fusy, and Zéphyr Salvy</i>	6:1–6:14
Composition Schemes: q -Enumerations and Phase Transitions in Gibbs Models	
<i>Cyril Banderier, Markus Kuba, Stephan Wagner, and Michael Wallner</i>	7:1–7:18
Galled Tree-Child Networks	
<i>Yu-Sheng Chang, Michael Fuchs, and Guan-Ru Yu</i>	8:1–8:13
On Fluctuations of Complexity Measures for the FIND Algorithm	
<i>Jasper Ischebeck and Ralph Neininger</i>	9:1–9:15
A Bijection for the Evolution of B -Trees	
<i>Fabian Burghart and Stephan Wagner</i>	10:1–10:15
Tree Walks and the Spectrum of Random Graphs	
<i>Eva-Maria Hainzl and Élie de Panafieu</i>	11:1–11:15
Asymptotics of Weighted Reflectable Walks in A_2	
<i>Torin Greenwood and Samuel Simon</i>	12:1–12:14
On the Number of Distinct Fringe Subtrees in Binary Search Trees	
<i>Stephan Wagner</i>	13:1–13:11
Early Typical Vertices in Subcritical Random Graphs of Preferential Attachment Type	
<i>Peter Mörters and Nick Schleicher</i>	14:1–14:10

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Asymptotics of Relaxed k -Ary Trees <i>Manosij Ghosh Dastidar and Michael Wallner</i>	15:1–15:13
Matching Algorithms in the Sparse Stochastic Block Model <i>Anna Brandenberger, Byron Chin, Nathan S. Sheffield, and Divya Shyamal</i>	16:1–16:21
Lexicographic Unranking Algorithms for the Twelfefold Way <i>Amaury Curiel and Antoine Genitrini</i>	17:1–17:14
Periodic Behavior of the Minimal Colijn-Plazzotta Rank for Trees with a Fixed Number of Leaves <i>Michael R. Dobioli, Hsien-Kuei Hwang, and Noah A. Rosenberg</i>	18:1–18:14
Binomial Sums and Mellin Asymptotics with Explicit Error Bounds: A Case Study <i>Benjamin Hackl and Stephan Wagner</i>	19:1–19:15
Multicoloured Hardcore Model: Fast Mixing and Its Applications as a Scheduling Algorithm <i>Sam Olesker-Taylor</i>	20:1–20:14
Binary Search Trees of Permuton Samples <i>Benoît Corsini, Victor Dubach, and Valentin Féray</i>	21:1–21:13
The Recurrence/Transience of Random Walks on a Bounded Grid in an Increasing Dimension <i>Shuma Kumamoto, Shuji Kijima, and Tomoyuki Shirai</i>	22:1–22:15
The Alternating Normal Form of Braids and Its Minimal Automaton <i>Vincent Jugé and June Roupin</i>	23:1–23:15
Analysis of Regular Sequences: Summatory Functions and Divide-And-Conquer Recurrences <i>Clemens Heuberger, Daniel Krenn, and Tobias Lechner</i>	24:1–24:14
Patricia's Bad Distributions <i>Louigi Addario-Berry, Pat Morin, and Ralph Neininger</i>	25:1–25:8
Limit Laws for Critical Dispersion on Complete Graphs <i>Umberto De Ambroggio, Tamás Makai, Konstantinos Panagiotou, and Annika Steibel</i>	26:1–26:12
Asymptotic Enumeration of Rooted Binary Unlabeled Galled Trees with a Fixed Number of Galls <i>Lily Agranat-Tamir, Michael Fuchs, Bernhard Gittenberger, and Noah A. Rosenberg</i>	27:1–27:14
Sharpened Localization of the Trailing Point of the Pareto Record Frontier <i>James Allen Fill, Daniel Q. Naiman, and Ao Sun</i>	28:1–28:21
Statistics of Parking Functions and Labeled Forests <i>Stephan Wagner and Mei Yin</i>	29:1–29:14
Depth-First Search Performance in Random Digraphs <i>Philippe Jacquet and Svante Janson</i>	30:1–30:15

■ Preface

The 35th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms (AofA 2024) was held at the University of Bath, UK, during June 17–21, 2024.

Analysis of algorithms is a scientific basis for quantifying the efficiency of computation, providing a link between abstract algorithms and the performance characteristics of their implementations in the real world. The general effort to predict precisely the performance of algorithms and data structures – the amount of time, storage, or other resources needed – has produced mathematical methods of sweeping generality that unify and simplify making such predictions in a rigorous way, as well as software tools supporting their application. In enabling this progress, AofA has come to involve research in analytic combinatorics, the analysis of random discrete structures, asymptotic analysis, exact and limiting distributions, and other fields of inquiry in computer science, probability theory, and enumerative combinatorics. See the AofA community websites for more details: <https://www.math.aau.at/AofA/>.

The Call for Papers invited papers in

- analytic algorithmics and combinatorics,
- probabilistic analysis of algorithms,
- randomized algorithms.

We also welcomed papers addressing problems such as: combinatorial algorithms, string searching and pattern matching, sublinear algorithms on massive data sets, network algorithms, graph algorithms, caching and memory hierarchies, indexing, data mining, data compression, coding and information theory, and computational finance. Papers were also welcomed that address bridges to research in related fields such as statistical physics, computational biology, computational geometry, and simulation.

The conference program featured the 2024 Philippe Flajolet Lecture by Michael Drmota, 30 contributed papers, which are collected in this volume, as well as 8 invited lectures:

- Antoine Genitrini (Sorbonne Université): “Varieties of Trees with Constrained Labelings”
- Leslie Goldberg (University of Oxford): “The Complexity of Approximate Counting”
- Daniel Krenn (Paris Lodron University of Salzburg): “Multi-pivot quicksort and how to compute precise asymptotics”
- László Kozma (Freie Universität Berlin): “Analysis of algorithms via extremal combinatorics”
- Alessandra Caraceni (Scuola Normale Superiore Pisa): “Growing random geometries: making trees blossom and triangulations flip”
- Markus Lohrey (Universität Siegen): “Grammar-based tree compression: combinatorics and algorithms”
- Thomas Sauerwald (University of Cambridge): “Balanced Allocations: The Power of Choice versus Noise”
- Sylvie Corteel (CNRS and Université Paris Cité): “Combinatorics of k-tilings”

As a typical convention in the field is to list authors in alphabetical order, we randomized the order of papers in these proceedings to avoid biases; the same order was used for the conference, so the proceedings volume gives paper in chronological order of presentation.

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Flajolet Lecture

The *Philippe Flajolet Lecture Prize* for outstanding contributions to analytic combinatorics and analysis of algorithms is awarded every two years by the Analysis of Algorithms (AofA) community.

At the AofA 2024 conference, Michael Drmota presented the sixth Flajolet Lecture, entitled “The Moment Method Revisited”. Previous Flajolet Lectures Prize recipients are Donald E. Knuth, Robert Sedgewick, Luc Devroye, Wojciech Szpankowski, and Svante Janson.

The prize is named in honor and recognition of the extraordinary accomplishments of the late Philippe Flajolet and his formative influence on the growth and flourishing of the AofA community. Philippe spent most of his scientific life at INRIA, France. He is best known for fundamental advances in mathematical methods for the analysis of algorithms. His research laid the foundation of a subfield of mathematics now known as analytic combinatorics. Analytic combinatorics is a modern basis for the quantitative study of combinatorial structures (such as words, trees, mappings, and graphs), with applications to probabilistic study of algorithms that are based on these structures. It also strongly influences research in other scientific domains, such as statistical physics, computational biology, and information theory. Flajolet’s work takes the field forward by introducing original approaches in combinatorics based on two types of methods: symbolic and analytic. The symbolic side is based on the automation of decision procedures in combinatorial enumeration to derive characterizations of generating functions. The analytic side treats those functions as functions in the complex plane and leads to precise characterization of limit distributions. Beyond these foundational contributions, Philippe’s research opened new avenues in various domains of applied computer science, including streaming algorithms, communication protocols, database access methods, data mining, symbolic manipulation, text-processing algorithms, and random generation.

Cécile Mailler and Sebastian Wild,
on behalf of the Program and Steering Committees

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