

## REPORT ON ICALP 2023

### 50th EATCS International Colloquium on Automata, Languages and Programming

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The 50th EATCS International Colloquium on Automata, Languages and Programming (**ICALP 2023**), the flagship conference and annual meeting of the European Association for Theoretical Computer Science (EATCS), took place in Paderborn, on July 10-14, 2023. The event was organized by the Computer Science Department of Paderborn University.

The main conference was preceded by a series of workshops on July 10, 2023. The following workshops were held as satellite events of ICALP 2023:

- Combinatorial Reconfiguration
- Graph Width Parameters: from Structure to Algorithms (GWP 2023)
- Algorithmic Aspects of Temporal Graphs VI
- Adjoint Homomorphism Counting Workshop (ad hoc)
- Congestion Games
- Workshop On Reachability, Recurrences, and Loops '23 (WORReLL'23)
- Workshop on Recent Trends in Online Algorithms
- Quantum Computing with Qiskit, and why Classical Algorithms still matter!
- Algebraic Complexity Theory

The scientific programme of ICALP 2023 consisted of 2 unifying lectures and 3 invited lectures of the two tracks of ICALP, the presentation of 132 contributed papers (which were selected by the Program Committees out of 443 submissions) and award sessions with the lectures of the EATCS Award 2023, the Presburger Award 2023 and the Alonzo Church Award 2023 recipients.

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**Organisation of ICALP 2023 and ICALP 50th special event.** ICALP 2023 took place at the Heinz-Nixdorf MuseumsForum and the Heinz-Nixdorf Institut in Paderborn, Germany (same venue as for ICALP 1996). The conference was primarily on-site, with 9 exceptions for remote presentations via Zoom (typically due to travel visa delays). Talks were 20 minutes in length, with 5 minutes for questions and for switching rooms between tracks. The conference had a SafeToC representative, Zahra Raissi. Early registration costs were 640 EUR for ICALP and 75 EUR for workshops (440 EUR and 75 EUR for students, respectively), and regular registration was 740 EUR and 100 EUR (540 EUR and 100 EUR, respectively). This was approximately 100 EUR higher than ICALP 2022 in Paris, but included all lunches and most evenings' dining. A somewhat non-conventional measure adopted this year was to require that each accepted paper have at least one *regular* registration (as opposed to *student* registration) — this ensured a lower bound on income through registration numbers, and minimized financial risk during planning. The workshops and conference had 226 and 267 participants, respectively, with a total of 335 unique participants combined for both events. The conference sponsors were DeepL (gold sponsor), SFB 901 On-The-Fly Computing (gold), Reply (silver), Stiebel Eltron (silver), PC<sup>2</sup> Paderborn Center for Parallel Computing (silver), Google Research (bronze), Heinz-Nixdorf Institut (bronze).

*Special events.* As this was the 50th occurrence of ICALP, various special events were planned. All registrants had free access to the Heinz-Nixdorf Museum-Forum's 6000m<sup>2</sup> Computer Science museum, spanning computing technologies from 3000 BC to the present. A special "50th ICALP anniversary session" featured additional invited talks by Kurt Mehlhorn (MPI) and Thomas Henzinger (ISTA). There was also a Colloquium in Honor of Friedhelm Meyer auf der Heide immediately after ICALP, and informally tied to ICALP, featuring invited talks by Artur Czumaj (Warwick), Kurt Mehlhorn (MPI), Christian Sohler (Cologne), and Martin Dietzfelbinger (Ilmenau). Finally, special social events included: (1) A Paderborn city tour and reception at the historical City Hall, (2) an outdoor German BBQ extravaganza, and (3) the conference dinner at the 160-year old Strate Brewery in Detmold, where brewery tours, a German brass band, and unlimited craft beers of various flavors were on tap.

*Organizing committee.* The organizing committee consisted of Johannes Blömer, Sevag Gharibian (chair), Friedhelm Meyer auf der Heide, Christian Scheideler, and Ulf-Peter Schroeder. A particular thank-you is due to Ulf-Peter, who pulled many of the strings behind the scenes.

On behalf of the entire community, we warmly thank all the organizers in

	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014
Total 443	433	462	470	490	502	459	515	507	477	
Track A	346	350	361	347	316	346	296	319	328	312
Track B	97	83	101	123	103	96	108	121	114	106
Track C	—	—	—	—	71	60	55	75	65	59

Table 1: Number of submitted papers at ICALP 2014–2023.

Paderborn for their fantastic efforts that helped to make ICALP 2023 and the 50th anniversary of ICALP a very successful and pleasant event.

**Paper selection and work of the Program Committee.** Since 2020 ICALP returned to the original two-track format. The ICALP 2023 program had the following two tracks:

- Track A: Algorithms, Complexity, and Games.
- Track B: Automata, Logic, Semantics, and Theory of Programming.

The PC chairs for the two tracks of ICALP 2023 were Uriel Feige (Track A) and Kousha Etessami (Track B). The two Program Committees involved 65 members (40 in track A and 25 in track B). In response to the call for papers, a total of 443 submissions were received: 346 for Track A and 97 for Track B. Each submission was assigned to at least three Program Committee members, aided by more than 600 external subreviewers. The Program Committees decided to accept 132 papers for inclusion in the scientific program: 103 papers for Track A and 29 for Track B. This gives the acceptance rate for the entire conference to be 29.7%. The selection was made by the Program Committees based on originality, quality, and relevance to theoretical computer science. The quality of the submitted manuscripts was very high, and unfortunately many strong papers could not be selected. We take this opportunity of thanking both the Program Committees and all the subreviewers for doing an exceptional selection job.

Statistical information about the number of papers submitted and accepted for the last several editions of the ICALP conference, as well as acceptance rates, are available in Tables 1–3.

**Invited presentations.** In addition to the contributed talks, ICALP 2023 featured five invited presentations, all available online at <https://videos.uni-paderborn.de/channel/ICALP-2023/94>.

	<b>2023</b>	2022	2021	2020	2019	2018	2017	2016	2015	2014
Total	132	127	137	138	146	147	137	146	143	136
Track A	103	103	108	102	94	98	88	89	89	87
Track B	29	24	29	36	31	30	32	36	34	31
Track C	—	—	—	—	21	19	17	21	20	18

Table 2: Number of accepted papers at ICALP 2014–2023.

	<b>2022</b>	2021	2020	2019	2018	2017	2016	2015	2014	2013
Total	29.7	29.3	29.6	29.4	29.8	29.3	29.8	28.3	28.2	28.5
Track A	29.7	29.4	29.9	29.4	29.7	28.3	29.7	27.9	27.1	27.9
Track B	29.8	28.9	28.7	29.3	30.1	31.3	29.6	29.8	29.8	29.2
Track C	—	—	—	—	29.6	31.7	30.9	28.0	30.8	30.5

Table 3: Acceptance rates (in %) for ICALP 2014–2023.

- Anna Karlin (University of Washington, USA), *(Slightly) Improved Approximation Algorithm for the Metric Traveling Salesperson Problem*,
- Rasmus Kyng (ETH Zurich, Switzerland), *An Almost-Linear Time Algorithm for Maximum Flow and More*,
- Rupak Majumdar (Max Planck Institute for Software Systems, Germany), *Context-Bounded Analysis of Concurrent Programs*,
- Thomas Vidick (California Institute of Technology, USA, and Weizmann Institute of Science, Israel), *Quantum codes, local testability and interactive proofs: state of the art and open questions*,
- James Worrell (University of Oxford, UK), *The Skolem Landscape*.

The 50th ICALP anniversary session, chaired by Burkhard Monien (University of Paderborn, Germany), featured two invited talks:

- Kurt Mehlhorn (Max Planck Institute Saarbrücken, Germany), *50 Years of ICALP, Personal Reminiscences*,
- Thomas Henzinger (IST, Austria), *From Formal Methods for Continuous Systems to the Safety of Neural Network Controllers*.

**ICALP Proceedings.** As it has been the tradition since 2016, ICALP proceedings were published with *LIPICs*. *LIPICs – Leibniz International Proceedings in Informatics* is a series of high-quality conference proceedings across all fields in informatics established in cooperation with Schloss Dagstuhl–Leibniz Center for Informatics. All 132 ICALP 2023 contributed papers presented at the conference, and papers or abstracts accompanying the invited talks, were published according to the principle of Open Access in *LIPICs Proceedings* volume 261, and made available online and free of charge at <https://drops.dagstuhl.de/opus/volltexte/2023/18051/>. The proceedings editors are Kousha Etessami, Uriel Feige and Gabriele Puppis.

**ICALP and EATCS Awards.** The EATCS sponsors awards for both a best paper and a best student paper in each of the two tracks at ICALP, as selected by the Program Committees. During the general assembly, the ICALP Best Paper and Best Student Paper Awards were presented to the authors of the following papers:

**Best Papers in Track A:** Tsun-Ming Cheung, Hamed Hatami, Pooya Hatami, and Kaave Hosseini, *Online Learning and Disambiguations of Partial Concept Classes*, and Miguel Bosch Calvo, Fabrizio Grandoni, and Afrouz Jabal Ameli, *A  $4/3$  Approximation for 2-Vertex-Connectivity*.

**Best Paper in Track B:** Marvin Künnemann, Filip Mazowiecki, Lia Schütze, Henry Sinclair-Banks, and Karol Wegrzycki, *Coverability in VASS Revisited: Improving Rackoff’s Bound to Obtain Conditional Optimality*.

**Best Student Paper in Track A:** Manuel Cáceres, *Minimum Chain Cover in Almost Linear Time*.

**Best Student Paper in Track B:** Ruiwen Dong, *The Identity Problem in  $\mathbb{Z} \wr \mathbb{Z}$  is decidable*.

The program of ICALP 2023 included presentations of several prestigious scientific awards sponsored or co-sponsored by EATCS:

- The **EATCS Award 2023**, the annual EATCS Distinguished Achievements Award given to acknowledge extensive and widely recognized contributions to theoretical computer science over a life long scientific career, was awarded to **Amos Fiat** (Tel Aviv University) for his fundamental work within many areas of theoretical computer science and in particular for work in cryptography, on-line algorithms, and algorithmic game theory.<sup>2</sup>

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<sup>2</sup>The laudatio for the EATCS Award 2023 is available at <https://eatcs.org/index.php/component/content/article/1-news/2939-the-eatcs-award-2023-laudatio-for-amos-fiat>.

- The **Presburger Award 2023** for Young Scientists was jointly awarded to **Aaron Bernstein** (Rutgers University) for his breakthroughs in devising fast graph algorithm, and to **Thatchaphol Saranurak** (University of Michigan) for his strong impact in developing new techniques for expander decomposition.<sup>3</sup>
- The **Alonzo Church Award 2023** for Outstanding Contributions to Logic and Computation went to the following group of papers for the design and implementation of Iris, a higher-order concurrent separation logic framework:
  - Ralf Jung, David Swasey, Filip Sieczkowski, Kasper Svendsen, Aaron Turon, Lars Birkedal, Derek Dreyer: “Iris: Monoids and Invariants as an Orthogonal Basis for Concurrent Reasoning”. POPL 2015.
  - Ralf Jung, Robbert Krebbers, Lars Birkedal, Derek Dreyer: “Higher-order ghost state”. ICFP 2016.
  - Robbert Krebbers, Ralf Jung, Aleš Bizjak, Jacques-Henri Jourdan, Derek Dreyer, Lars Birkedal: “The Essence of Higher-Order Concurrent Separation Logic”. ESOP 2017.
  - Ralf Jung, Robbert Krebbers, Jacques-Henri Jourdan, Aleš Bizjak, Lars Birkedal, Derek Dreyer: “Iris from the ground up: A modular foundation for higher-order concurrent separation logic”. J. Funct. Program. 28 (2018).
- The **EATCS Distinguished Dissertation Awards 2023**, to promote and recognize outstanding dissertations in theoretical computer science were awarded to three researchers:
  - **Kuikui Liu** (University of Washington) for his dissertation *Spectral Independence: A New Tool to Analyze Markov Chains*, supervised by Shayan Oveis Gharan.
  - **Alex Lombardi** (MIT, Department of Electrical Engineering and Computer Science) for his dissertation *Provable Instantiations of Correlation Intractability and the Fiat-Shamir Heuristic*, supervised by Vinod Vaikuntanathan,
  - **Lijie Chen** (MIT, Department of Electrical Engineering and Computer Science) for his dissertation *Better Hardness via Algorithms, and New Forms of Hardness versus Randomness*, supervised by Ryan Williams.

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<sup>3</sup>The laudatio for the Presburger Award 2023 is available at <https://eatcs.org/index.php/component/content/article/1-news/2950-presburger-award-2023-laudatio>.

- The EATCS has recognized three of its members for their outstanding contributions to theoretical computer science by naming them **EATCS Fellows** class of 2023:
  - Michael A. Bender (Stoney Brook University),
  - Leslie Ann Goldberg (University of Oxford),
  - Claire Mathieu (CNRS, IRIF, Université de Paris).

The recipients of the EATCS Award 2023 (Amos Fiat), of the Presburger Award 2023 (Aaron Bernstein and Thatchaphol Saranurak), and of the Alonzo Church Award 2023 (Ralf Jung, Derek Dreyer and Robbert Krebbers) gave presentations in the Award Sessions.

We congratulate all the winners and we hope their achievements will put the highlights of research in theoretical computer science in the spotlight, and will serve as inspirations to young researchers in the years to come.

We hope that this conference report gives you a glimpse of the rich scientific and social programme that made the 50th ICALP an unforgettable conference. Everyone involved in the organization of ICALP 2023 deserves the warmest thanks from the TCS community.

We wish to thank all authors who submitted extended abstracts for consideration, the Program Committees for their effort, and all the referees who assisted the Program Committees in the evaluation process. We are particularly grateful to the Conference Chair Sevag Gharibian for the perfect organisation of the conference. We also acknowledge financial support from DeepL, SFB 901 On-The-Fly Computing, Reply, Stiebel Eltron, PC<sup>2</sup> Paderborn Center for Parallel Computing, Google Research, and the Heinz-Nixdorf Institut.

The General Assembly of the EATCS was informed about the progress of the organization of the *51st EATCS International Colloquium on Automata, Languages and Programming*, ICALP 2024, that will take place in Tallinn, Estonia on July 10–14, 2024, with Pawel Sobocinski as the general chair of the conference. The ICALP 2024 Program Committee Chairs are Ola Svensson and Karl Bringmann (Track A) and Martin Grohe (Track B). ICALP 2024 will be co-located with *IEEE Logic in Computer Science (LiCS)*.

We hope that you will make plans to submit your best work to ICALP 2024 and be able to go to Tallinn for the conference. We look forward to seeing you there.