



Philipp Czermer
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 German (native), English (fluent)



Education

Doctoral studies in computer science , TU Munich, Germany	since 11/20
“Computational Limits of Population Protocols”	
thesis submitted 02/25, expected graduation 07/25	
MSc Informatics , TU Munich, Germany	04/18–09/20
passed with high distinction (1.0)	
“Semi-oblivious Routing Strategies for Directed Graphs”	
BSc Informatics , TU Clausthal, Germany	10/14–03/18
passed with high distinction (1.0)	
“How realistic is a change coupling graph? Estimations with convolutional networks.”	
▪ <i>Study abroad</i> , University of Durham, UK	09/17–03/18
Abitur , Bertolt-Brecht-Gymnasium in Dortmund, Germany	06/14
final grade: 884/900 (1.0)	

Note: In Germany, passing grades are 1.0–4.0, with 1.0 being the best grade.

Employment

TU Munich	since 11/20	TU Munich	10/18–03/20
<i>Scientific Employee</i>		<i>Student Assistant</i>	
TU Clausthal	10/15–08/17	Elmos Semiconductor AG	07/12–03/17
<i>Student Assistant</i>		<i>Part-time, IT</i>	

Awards and Scholarships

Best paper award, SAND 2025	04/25
Best student paper award, SAND 2025	04/25
Doctoral scholarship of the German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes)	11/22–02/25
TeachInf Award of the Student Union for the best bachelor course	06/22
Best paper award, SAND 2022	03/22
Förderpreis award of the TU Clausthal VVF for my bachelor’s thesis	10/18
Scholarship of the German Academic Scholarship Foundation (Studienstiftung des deutschen Volkes)	01/15–09/20

Research

- **Automated reasoning**; practical verification under a computational asymmetry with interactive certification, zero-knowledge proofs, and

- **Distributed computing**; theoretical analysis of population protocols and related models, w.r.t. space complexity, time-space tradeoffs and fault-tolerance.
- also **oblivious routing** and **regular model checking**.

Conferences. I have published 10 full papers in international, peer-reviewed conferences, as well as 2 brief announcements. Two further publications have been accepted. Conferences include CAV, PODC, DISC, ESA, and others.

Journals. In total, 4 publications of mine have appeared in journals, 2 of which were invited after prior publication at a conference. One further publication appeared in a Festschrift.

Talks. I have given 8 talks at international conferences, one invited talk at a workshop, 2 invited talks at university seminars, and 5 talks at workshops.

Peer review. I have peer-reviewed 11 publications for international conferences and journals, including FOCS, the SIAM Journal on Computing, TACAS, and others.

Teaching. I organised and co-organised 6 lectures in computer science, including three large courses (>1000 students). I was tutor in 16 further courses in computer science and mathematics. In total, I held roughly 530 hours of tutorials. I supervised 16 theses and projects of students, all on topics in theoretical computer science.

Technical Skills

Languages. Over a decade of experience in **C++**, **Python**. Also worked professionally in *Java*, *TCL*. Minor projects in *C*, *R*, *Haskell* and many others.

Selected projects.

puder Python , transformer-based prediction of MTG drafts based on imitation learning, performance comparable with strong humans	source , online
blic C++ , competitive BDD-based QBF solver with built-in computationally asymmetric verification of results, roughly 300 times faster certification than conventional techniques	source
obst C++ , interactive visualisation of binary decision diagrams, used for teaching advanced courses at multiple universities	source , online
i3ipc-simple C , easy to use C library to interact with i3's IPC interface	source
schaf C++ , graph classifier using convolutional neural networks	source
alarm Python , efficient download of git repository metadata	source
philib C++ , personal standard library	source

Publications

- [1] Philipp Czerner, Vincent Fischer, and Roland Guttenberg
The Expressive Power of Uniform Population Protocols with Logarithmic Space
In: *SAND 2025*. To appear. Best paper award.
- [2] Flavio Principato, Javier Esparza, and Philipp Czerner
Undecidability of the Emptiness Problem for Weak Models of Distributed Computing
In: *SAND 2025*. To appear. Best student paper award.
- [3] Michael Blondin, Michaël Cadilhac, Xin-Yi Cui, Philipp Czerner, Javier Esparza, and Jakob Schulz
Weakly Acyclic Diagrams: A Data Structure for Infinite-State Symbolic Verification

- In: *Tools and Algorithms for the Construction and Analysis of Systems - 31st International Conference, TACAS 2025, Held as Part of the International Joint Conferences on Theory and Practice of Software, ETAPS 2025, Hamilton, ON, Canada, May 3-8, 2025, Proceedings, Part III*. Ed. by Arie Gurfinkel and Marijn Heule. Vol. 15698. Lecture Notes in Computer Science. Springer, 2025, pp. 23–42. DOI: [10.1007/978-3-031-90660-2_2](https://doi.org/10.1007/978-3-031-90660-2_2). URL: https://doi.org/10.1007/978-3-031-90660-2%5C_2.
- [4] Philipp Czerner
Breaking Through the $\Omega(n)$ -Space Barrier: Population Protocols Decide Double-Exponential Thresholds
 In: *38th International Symposium on Distributed Computing, DISC 2024, October 28 to November 1, 2024, Madrid, Spain*. Ed. by Dan Alistarh. Vol. 319. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2024, 17:1–17:18. DOI: [10.4230/LIPICS.DISC.2024.17](https://doi.org/10.4230/LIPICS.DISC.2024.17).
- [5] Philipp Czerner, Javier Esparza, and Valentin Krasotin
A Resolution-Based Interactive Proof System for UNSAT
 In: *Foundations of Software Science and Computation Structures - 27th International Conference, FoSSaCS 2024, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2024, Luxembourg City, Luxembourg, April 6-11, 2024, Proceedings, Part II*. Ed. by Naoki Kobayashi and James Worrell. Vol. 14575. Lecture Notes in Computer Science. Springer, 2024, pp. 116–136. DOI: [10.1007/978-3-031-57231-9_6](https://doi.org/10.1007/978-3-031-57231-9_6).
- [6] Philipp Czerner, Javier Esparza, Valentin Krasotin, and Christoph Welzel-Mohr
Computing Inductive Invariants of Regular Abstraction Frameworks
 In: *35th International Conference on Concurrency Theory, CONCUR 2024, September 9-13, 2024, Calgary, Canada*. Ed. by Rupak Majumdar and Alexandra Silva. Vol. 311. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2024, 19:1–19:18. DOI: [10.4230/LIPICS.CONCUR.2024.19](https://doi.org/10.4230/LIPICS.CONCUR.2024.19).
- [7] Philipp Czerner, Vincent Fischer, and Roland Guttenberg
Brief Announcement: The Expressive Power of Uniform Population Protocols with Logarithmic Space
 In: *38th International Symposium on Distributed Computing, DISC 2024, October 28 to November 1, 2024, Madrid, Spain*. Ed. by Dan Alistarh. Vol. 319. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2024, 44:1–44:7. DOI: [10.4230/LIPICS.DISC.2024.44](https://doi.org/10.4230/LIPICS.DISC.2024.44).
- [8] Philipp Czerner, Roland Guttenberg, Martin Helfrich, and Javier Esparza
Fast and succinct population protocols for Presburger arithmetic
 In: *J. Comput. Syst. Sci.* 140 (2024), p. 103481. DOI: [10.1016/J.JCSS.2023.103481](https://doi.org/10.1016/J.JCSS.2023.103481).
- [9] Benno Lossin, Philipp Czerner, Javier Esparza, Roland Guttenberg, and Tobias Prehn
The Black Ninjas and the Sniper: On Robust Population Protocols
 In: *Principles of Verification: Cycling the Probabilistic Landscape - Essays Dedicated to Joost-Pieter Katoen on the Occasion of His 60th Birthday, Part III*. Ed. by Nils Jansen, Sebastian Junges, Benjamin Lucien Kaminski, Christoph Matheja, Thomas Noll, Tim Quatmann, Mariëlle Stoelinga, and Matthias Volk. Vol. 15262. Lecture Notes in Computer Science. Springer, 2024, pp. 206–233. DOI: [10.1007/978-3-031-75778-5_10](https://doi.org/10.1007/978-3-031-75778-5_10).
- [10] Eszter Couillard, Philipp Czerner, Javier Esparza, and Rupak Majumdar
Making IP = PSPACE Practical: Efficient Interactive Protocols for BDD Algorithms
 In: *Computer Aided Verification - 35th International Conference, CAV 2023, Paris, France, July 17-22, 2023, Proceedings, Part III*. Ed. by Constantin Enea and Akash Lal. Vol. 13966. Lecture Notes in Computer Science. Springer, 2023, pp. 437–458. DOI: [10.1007/978-3-031-37709-9_21](https://doi.org/10.1007/978-3-031-37709-9_21).
- [11] Philipp Czerner
Brief Announcement: Population Protocols Decide Double-exponential Thresholds

- In: *Proceedings of the 2023 ACM Symposium on Principles of Distributed Computing, PODC 2023, Orlando, FL, USA, June 19-23, 2023*. Ed. by Rotem Oshman, Alexandre Nolin, Magnús M. Halldórsson, and Alkida Balliu. ACM, 2023, pp. 28–31. DOI: [10.1145/3583668.3594571](https://doi.org/10.1145/3583668.3594571).
- [12] Philipp Czerner, Javier Esparza, and Jérôme Leroux
Lower bounds on the state complexity of population protocols
 In: *Distributed Comput.* 36.3 (2023), pp. 209–218. DOI: [10.1007/S00446-023-00450-4](https://doi.org/10.1007/S00446-023-00450-4).
- [13] Philipp Czerner, Roland Guttenberg, Martin Helfrich, and Javier Esparza
Fast and Succinct Population Protocols for Presburger Arithmetic
 In: *1st Symposium on Algorithmic Foundations of Dynamic Networks, SAND 2022, March 28-30, 2022, Virtual Conference*. Ed. by James Aspnes and Othon Michail. Vol. 221. LIPIcs. Best paper award. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022, 11:1–11:17. DOI: [10.4230/LIPICS.SAND.2022.11](https://doi.org/10.4230/LIPICS.SAND.2022.11). URL: <https://doi.org/10.4230/LIPICS.SAND.2022.11>.
- [14] Philipp Czerner and Javier Esparza
Lower Bounds on the State Complexity of Population Protocols
 In: *PODC '21: ACM Symposium on Principles of Distributed Computing, Virtual Event, Italy, July 26-30, 2021*. Ed. by Avery Miller, Keren Censor-Hillel, and Janne H. Korhonen. ACM, 2021, pp. 45–54. DOI: [10.1145/3465084.3467912](https://doi.org/10.1145/3465084.3467912).
- [15] Philipp Czerner, Roland Guttenberg, Martin Helfrich, and Javier Esparza
Decision Power of Weak Asynchronous Models of Distributed Computing
 In: *PODC '21: ACM Symposium on Principles of Distributed Computing, Virtual Event, Italy, July 26-30, 2021*. Ed. by Avery Miller, Keren Censor-Hillel, and Janne H. Korhonen. ACM, 2021, pp. 115–125. DOI: [10.1145/3465084.3467918](https://doi.org/10.1145/3465084.3467918).
- [16] Philipp Czerner and Stefan Jaax
Running Time Analysis of Broadcast Consensus Protocols
 In: *Foundations of Software Science and Computation Structures - 24th International Conference, FOS-SACS 2021, Held as Part of the European Joint Conferences on Theory and Practice of Software, ETAPS 2021, Luxembourg City, Luxembourg, March 27 - April 1, 2021, Proceedings*. Ed. by Stefan Kiefer and Christine Tasson. Vol. 12650. Lecture Notes in Computer Science. Springer, 2021, pp. 164–183. DOI: [10.1007/978-3-030-71995-1_9](https://doi.org/10.1007/978-3-030-71995-1_9).
- [17] Philipp Czerner and Harald Räcke
Compact Oblivious Routing in Weighted Graphs
 In: *28th Annual European Symposium on Algorithms, ESA 2020, September 7-9, 2020, Pisa, Italy (Virtual Conference)*. Ed. by Fabrizio Grandoni, Grzegorz Herman, and Peter Sanders. Vol. 173. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2020, 36:1–36:23. DOI: [10.4230/LIPICS.ESA.2020.36](https://doi.org/10.4230/LIPICS.ESA.2020.36).
- [18] Philipp Czerner and Jonathan Pieper
Multi-agent programming contest 2016: lampe team description
 In: *Int. J. Agent Oriented Softw. Eng.* 6.1 (2018), pp. 101–117. DOI: [10.1504/IJA0SE.2018.10010605](https://doi.org/10.1504/IJA0SE.2018.10010605).
- [19] Philipp Czerner and Jonathan Pieper
Multi-agent programming contest 2017: lampe team description
 In: *Ann. Math. Artif. Intell.* 84.1-2 (2018), pp. 95–115. DOI: [10.1007/S10472-018-9581-2](https://doi.org/10.1007/S10472-018-9581-2).