

Sarah Winter

Academic CV

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Research **synthesis, formal methods, automata and transducer theory, game theory**
Interests

Research Positions

- since Sep. 2023 **Associate professor (Maîtrese de conférences)**, *Université Paris Cité*, France, Institut de Recherche en Informatique Fondamentale (IRIF).
- July 2019 – Aug. 2023 **Postdoctoral researcher**, *Université de libre Bruxelles*, Belgium, Formal Methods and Verification group, team of Emmanuel Filiot.
- Jan. 2019 – June 2019 **Postdoctoral researcher**, *RWTH Aachen University*, Germany, Chair of Logic and Theory of Discrete Systems, team of Christof Löding.

Education

- 2014 – 2018 **Ph.D. Computer Science**, *RWTH Aachen University*, Germany
Thesis entitled *Synthesis of Transducers from Relations on Finite Words and Trees* advised by Christof Löding.
- 2011 – 2014 **M.Sc. Computer Science**, *RWTH Aachen University*, Germany
Thesis entitled *Uniformization of Automaton Definable Tree Relations* advised by Christof Löding.
- 2007 – 2011 **B.Sc. Computer Science**, *RWTH Aachen University*, Germany
Thesis entitled *Finite Automata over Infinite Alphabets* advised by Wolfgang Thomas.

Research Grants

- 2021 **FNRS (Le Fonds de la Recherche Scientifique) Postdoctoral Researcher (Chargée de recherches) Grant**
3 year duration.

Awards

- 2018 **Best Student Paper ICALP'18**
Awarded for the paper entitled *Uniformization Problems for Synchronizations of Automatic Relations on Words* (see [c8]) presented at ICALP'18 Track B.

Publications

In computer science, it is customary to publish mainly in conference proceedings, and some of the most prestigious venues are peer-reviewed international conferences. In theoretical computer science, the order of authors is typically alphabetical. Full versions of all my papers are linked on my website.

Preprints

- [p1] Sarah Winter and Martin Zimmermann. Prophecies all the way: Game-based model-checking for hyperqptl beyond $\forall^*\exists^*$. *To appear in CONCUR*, 2025. doi:10.48550/ARXIV.2404.18280.
- [p2] Sarah Winter and Martin Zimmermann. Tracy, Traces, and Transducers: Computable Counterexamples and Explanations for HyperLTL Model-Checking. 2024. doi:10.48550/ARXIV.2404.18280.

Peer-reviewed Journals

- [j1] Martin Fränzle, Paul Kröger, Sarah Winter, and Martin Zimmermann. On the existence of reactive strategies resilient to delay. *Log. Methods Comput. Sci.*, vol. 21(1), 2025. doi:10.46298/lmcs-21(1:24)2025.
- [j2] Emmanuel Filiot, Ismaël Jecker, Gabriele Puppis, Christof Löding, Anca Muscholl, and Sarah Winter. Finite-valued streaming string transducers. *TheoretiCS*, vol. 4, 2025. doi:10.46298/theoretics.25.1.
- [j3] Emmanuel Filiot and Sarah Winter. Synthesizing computable functions from rational specifications over infinite words. *Int. J. Found. Comput. Sci.*, vol. 35(1&2):179–214, 2024. doi:10.1142/S012905412348009X.
- [j4] Sarah Winter and Martin Zimmermann. Weak muller conditions make delay games hard. *IMS LNS*, vol. 42, Aspects of Computation and Automata Theory with Applications:425–464, 2023. doi:10.1142/9789811278631_0016.
- [j5] Christof Löding and Sarah Winter. Resynchronized Uniformization and Definability Problems for Rational Relations. *Discret. Math. Theor. Comput. Sci.*, vol. 25(2), 2023. doi:10.46298/dmtcs.7460.
- [j6] Sarah Winter and Martin Zimmermann. Finite-state strategies in delay games. *Inf. Comput.*, vol. 272, 2020. doi:10.1016/j.ic.2019.104500.
- [j7] Christof Löding and Sarah Winter. Synthesis of deterministic top-down tree transducers from automatic tree relations. *Inf. Comput.*, vol. 253:336–354, 2017. doi:10.1016/j.ic.2016.07.013.

Peer-reviewed Conference Proceedings

- [c1] Emmanuel Filiot, Ismaël Jecker, Christof Löding, Anca Muscholl, Gabriele Puppis, and Sarah Winter. Finite-valued streaming string transducers. In *LICS*, 2024. doi:10.1145/3661814.3662095.
- [c2] Martin Fränzle, Sarah Winter, and Martin Zimmermann. Strategies Resilient to Delay: Games under Delayed Control vs. Delay Games. In *GandALF*, 2023. doi:10.4204/EPTCS.390.14.

- [c3] Olivier Carton, Gaëtan Douéneau-Tabot, Emmanuel Filiot, and Sarah Winter. Deterministic regular functions of infinite words. In **ICALP**, 2023. doi:10.4230/LIPIcs.ICALP.2023.121.
- [c4] Emmanuel Filiot, Ismaël Jecker, Christof Löding, and Sarah Winter. A regular and complete notion of delay for streaming string transducers. In **STACS**, 2023. doi:10.4230/LIPIcs.STACS.2023.32.
- [c5] Emmanuel Filiot and Sarah Winter. Synthesizing computable functions from rational specifications over infinite words. In **FSTTCS**, 2021. doi:10.4230/LIPIcs.FSTTCS.2021.43.
- [c6] Sarah Winter. Decision problems for origin-close top-down tree transducers. In **MFCS**, 2021. doi:10.4230/LIPIcs.MFCS.2021.90.
- [c7] Emmanuel Filiot, Christof Löding, and Sarah Winter. Synthesis from weighted specifications with partial domains over finite words. In **FSTTCS**, 2020. doi:10.4230/LIPIcs.FSTTCS.2020.46.
- [c8] Sarah Winter. Uniformization problems for synchronizations of automatic relations on words. In **ICALP**, 2018. doi:10.4230/LIPIcs.ICALP.2018.142.
- [c9] Emmanuel Filiot, Ismaël Jecker, Christof Löding, and Sarah Winter. On equivalence and uniformisation problems for finite transducers. In **ICALP**, 2016. doi:10.4230/LIPIcs.ICALP.2016.125.
- [c10] Christof Löding and Sarah Winter. Uniformization problems for tree-automatic relations and top-down tree transducers. In **MFCS**, 2016. doi:10.4230/LIPIcs.MFCS.2016.65.
- [c11] Christof Löding and Sarah Winter. Synthesis of deterministic top-down tree transducers from automatic tree relations. In **GandALF**, 2014. doi:10.4204/EPTCS.161.10.

Peer-reviewed Workshop Proceedings

- [w1] Alex Spelten, Wolfgang Thomas, and Sarah Winter. Trees over infinite structures and path logics with synchronization. In **INFINITY**, 2011. doi:10.4204/EPTCS.73.5.

Theses

- [t1] Sarah Winter. *Synthesis of transducers from relations on finite words and trees*. PhD thesis, RWTH Aachen University, Germany, 2018. URL: <http://publications.rwth-aachen.de/record/760326>.
- [t2] Sarah Winter. *Uniformization of Automaton Definable Tree Relations*. Master's thesis, RWTH Aachen University, Germany, 2013. URL: <https://sarahwinter.net/pdfs/master-winter.pdf>.
- [t3] Sarah Winter. *Finite Automata over Infinite Alphabets*. Bachelor's thesis, RWTH Aachen University, Germany, 2011. URL: <https://sarahwinter.net/pdfs/bachelor-winter.pdf>.

Invited Events

Slides for selected talks are available on my website.

International Conferences

- 2024 **RAMiCS'24 & AiML'24**, Prague, Czech Republic
"Finite-valued Streaming String Transducers"

International Workshops

- 2021 **Trends in Transformations**, *Workshop as part of FSTTCS'21*, online
"Unambiguity, Functionality, and Computability in Transducer Theory"
- Spotlight on Transducers**, *Highlights'21 Satellite Workshop*, online
"Synthesis of Computable Functions"
- Online Worldwide Seminar on Logic and Semantics (OWLS)**, online
"Synthesizing Computable Functions from Synchronous Specifications"

Specialized Workshops

- 2023 **Dagstuhl Seminar on Regular Transformations**, *Schloss Dagstuhl Leibniz-Zentrum für Informatik, Germany*
- 2022 **Autobóz Workshop**, *Sobótka, Poland*
- 2021 **Dagstuhl Seminar on Unambiguity in Automata Theory**, *Schloss Dagstuhl Leibniz-Zentrum für Informatik, Germany*

Seminars

- 2023 Formal Methods Laboratory, *Université Paris-Saclay, France*
LaBRI, *Université de Bordeaux, France*
LIP6, *Sorbonne Université, France*
CRIStAL, *Université de Lille, France*
- 2022 IRIF, *Université Paris Cité, France*
Distributed, Embedded and Intelligent Systems group, *Aalborg University, Denmark*
- 2019 LaBRI, *Université de Bordeaux, France*
Verification group, *University of Liverpool, UK*
- 2017 Reactive Systems group, *Saarland University, Germany*
- 2015 Oxford Control and Verification group, *University of Oxford, UK*
- 2014 Formal Methods and Verification group, *Université libre de Bruxelles, Belgium*

Miscellaneous

- 2022 TCS Seminar for Master Students, *UAntwerpen, Belgium*
"Transducers and Their Decision Problems"

Teaching

Teaching Assistant

- 2x **Introduction to Programming 1 (Java)**, *Bachelor's course @ Paris Cité*
- 1x **Introduction to Programming 2 (Java)**, *Bachelor's course @ Paris Cité*
- 2x **Automata and Lexical Analysis**, *Bachelor's course @ Paris Cité*

- 2x **Databases**, *Bachelor's course @ Paris Cité*
- 1x **Algorithms**, *Bachelor's course @ Paris Cité*
- 1x **Fundamentals of Computer Science**, *Bachelor's course @ ULB*
- 1x **Computer Science Project**, *Bachelor's project @ ULB*
 - Creation and supervision of a project on *Machine Playing of Two-Player Games on the Example of Reversi*
- 4x **Introduction to Language Theory and Compiling**, *Master's course @ ULB*
 - Course includes an extensive project on building a compiler.
- 1x **Advanced Automata Theory**, *Bachelor+Master's course @ RWTH*
- 3x **Infinite Computations and Games**, *Master's course @ RWTH*
- 1x **Tree Automata**, *Master's course @ RWTH*
- 6x **Automata, Languages, Complexity**, *Bachelor's course @ RWTH*
- 2x **Formal Systems, Automata, Processes**, *Bachelor's course @ RWTH*

Supervision

I have supervised students during their Bachelor's thesis in computer science: 3 in 2018, 2 in 2017 and 1 in 2016. The topics were all in the area of automata theory.

Community Responsibilities

Reviewing Activities

- PC member RP 2025, GandALF 2025, ICALP 2024
- Conferences MFCS 2025, ICALP 2025, LICS 2024, MFCS 2023, ICALP 2023, FoSSaCS 2023, CIAA 2022, LICS 2022, CSL 2022, MFCS 2021, Concur 2021, ATVA 2021, ICALP 2021, FoSSaCS 2021, FSTTCS 2020, LICS 2020, LATA 2020, FSTTCS 2019, DCFS 2019, ICALP 2019, STACS 2019, ICALP 2018, ...
- Journals Logical Methods in Computer Science (LMCS), Information Processing Letter (IPL), Journal of Computer and System Sciences (JCSS), Theoretical Computer Science (TCS), Innovations in Systems and Software Engineering (ISSE), Formal Methods in System Design (FORM), Information and Computation (Inf. Comp.)
- Other Project assesment for National Science Center Poland (NCN)

Miscellaneous

- 2025 Co-organizer of Autobóz Workshop in Grenaa, Denmark
- 2020 Orga-team member of GandALF (online) in Brussels, Belgium
- 2015 Orga-team member of Young Researchers' Conference "Frontiers of Formal Methods" in Aachen, Germany