Reinis Cirpons
Postdoctoral Researcher

Experience

2025/11-Present **Postdoctoral researcher**
INRIA
Nantes, France

2019/06-Present **Contributor**
Digraphs package and *libsemigroups* C++ library

2021/09-2025/09 **Tutor**
University Of St Andrews
St Andrews, United Kingdom

2020/07-2022/08 **Junior Researcher**
Whitecryption
Riga, Latvia

Education

2021/09-2025/11 **PhD in Mathematics**
University Of St Andrews - St Andrews, UK
• Thesis title: "Automata theoretic methods for computation in semigroups"

2017/09-2021/05 **Master of Mathematics (hons.) 1st class**
University Of St Andrews - St Andrews, UK
• Dean's List for academic excellence 2017-2021
• President of the St Andrews Mathematics Society.

Publications

1. R. Cirpons, J. East, and J. D. Mitchell. Minimum transformation representations of diagram monoids. *International Mathematics Research Notices*, 2026(6), March 2026a. doi:10.1093/imrn/rnag041

2. R. Cirpons, F. Hivert, A. Mahboubi, G. Melquiond, J. D. Mitchell, and F. Smith. Certifying the decidability of the word problem in monoids at large. In *Proceedings of the 15th ACM SIGPLAN International Conference on Certified Programs and Proofs*, page 128–142, January 2026b. doi:10.1145/3779031.3779101

3. M. Anagnostopoulou-Merkouri, R. Cirpons, J. D. Mitchell, and M. Tsalakou. Computing finite index congruences of finitely presented semigroups and monoids. *Mathematics of Computation*, December 2025. ISSN 0025-5718. doi:10.1090/mcom/4136

4. R. Cirpons, J. D. Mitchell, and F. L. Smith. Off with the head: termination provers and the word problem for 1-relation monoids. In *Proceedings of the 20th International Workshop on Termination*, September 2025

5. R. Cirpons and J.D. Mitchell. Polynomial time multiplication and normal forms in free bands. *Theoretical Computer Science*, 953:113783, 2023. doi:10.1016/j.tcs.2023.113783

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Links

Personal webpage
reinisc.id.lv

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Github
reinscirpons

Languages

English
Latvian
Russian

Talks

- **Extensions of the Todd-Coxeter algorithm via automata theory**,
  Workshop on Series, Automata, Matrices, Symbolic dynamics, and their Applications,
  Warsaw, Poland, June 2026.
- **Certifying the decidability of the word problem in monoids, at large**,
  15th ACM SIGPLAN International Conference on Certified Programs and Proofs,
  Rennes, France, January 2026.
- **Off with the head: termination provers and the word problem for 1-relation monoids**,
  20th International Workshop on Termination, Leipzig, Germany, September 2025.
- **Maximal one-sided congruences of full transformation monoids**,
  Semigroups Day VI, St Andrews, UK, June 2025.
- **Computing finite-index congruences**,
  75th British Mathematical Colloquium, Manchester, UK, June 2024.
- **Computing with free bands**,
  York Semigroup seminar, York, UK, November 2023.
- **Making the Knuth-Bendix algorithm exponentially slower**,
  Semigroups Day, St Andrews, UK, June 2023

Software contributions

- **The `libsemigroups` C++ library**.
  A C++ library for computing with finite and finitely presented semigroups. Implemented finiteness criteria for monoids based on approaches from linear algebra, improved the implementation of the Sims algorithm for finite index congruences of monoids and helped with the changes for version 3 of the library.
  URL: https://github.com/libsemigroups/libsemigroups
  doi: 10.5281/zenodo.1437752
- **The `freebandlib` Python library**.
  A Python library for computing with finitely generated free bands. Contains implementations of algorithms from "Polynomial time multiplication and nor- mal forms in free bands".
  URL:https://github.com/reiniscirpons/freebandlib
  doi:10.5281/zenodo.7071675
- **The `GAP` system for computer algebra**.
  A widely used open source computer algebra system. Improved orbit calculation code and extended the testing language.
  URL: https://github.com/gap-system/gap
- **The `Digraphs` package for `GAP`**.
  A GAP package implementing various algorithms computation with directed graphs. Implemented methods for computing the number of spanning trees of a graph, generating random lattices and finding maximum matchings. Improved orbit calculations for actions on digraphs via hashing.
  URL: https://github.com/digraphs/Digraphs
  doi: 10.5281/zenodo.596465
- **The `Semigroups` package for `GAP`**.
  A GAP package implementing various algorithms computation with semigroups. Improved computation with free bands.
  URL: https://github.com/semigroups/Semigroups
  doi: 10.5281/zenodo.592893