Clemens Hofstadler

Postdoctoral researcher

Johannes Kepler University
Altenberger Straße 69
4040 Linz, Austria
clemens.hofstadler@jku.at
clemenshofstadler.com
** 23.10.1995, Austria*

Employment

03.2024 – 12.2025 **Postdoctoral researcher**, *Institute for Symbolic Artificial Intelligence*, Johannes Kepler University Linz, Austria

03.2022 – 02.2024 **Research fellow**, *Institute of Mathematics*, University of Kassel, Germany
Project: *Symbolic computations for identities of linear operators*

12.2019 – 02.2022 **Research fellow**, *Institute for Algebra*, Johannes Kepler University Linz, Austria
Project: *Symbolic computations for identities of linear operators*

Education

05.2020 – 10.2023 **PhD studies**, *Engineering Sciences (Computer Mathematics)*, Johannes Kepler University Linz, Austria
(passed with distinction)
Thesis: *Noncommutative Gröbner bases and automated proofs of operator statements*
Supervisor: Georg Regensburger, Co-Supervisor: Clemens G. Raab

02.2020 – 02.2022 **Master studies**, *Artificial Intelligence*, Johannes Kepler University Linz, Austria
(passed with distinction)
Thesis: *Solving QBFs with AlphaZero and MCTS*
Supervisor: Martina Seidl, Co-Supervisor: Maximilian Heisinger

03.2019 – 05.2020 **Master studies**, *Computer Mathematics*, Johannes Kepler University Linz, Austria
(passed with distinction)
Thesis: *Certifying operator identities and ideal membership of noncommutative polynomials*
Supervisor: Georg Regensburger, Co-Supervisor: Clemens G. Raab

10.2015 – 03.2019 **Bachelor studies**, *Technical Mathematics*, Johannes Kepler University Linz, Austria
(passed with distinction)

2006 – 2014 **High school**, Linz, Austria
(passed with distinction)

Awards

2025 **Promotio sub auspiciis Praesidentis rei publicae** awarding outstanding academic achievements in Austria. It is the highest possible distinction for academic achievements for a doctoral degree in Austria, *Austrian Federal Ministry of Education, Science and Research*, Vienna, Austria

2024 **Dissertationspreis (Dissertation price)** awarded by the Fachgruppe Computeralgebra for an outstanding dissertation in the field of computer algebra, *Fachgruppe Computeralgebra*, Leipzig, Germany

2024 **JKU Young Researchers' Award** recognizing outstanding scientific achievements during the PhD, *Johannes Kepler University*, Linz, Austria

2023 **Young Talent Award** recognizing an aspiring young researcher in the field of computer algebra, *Computeralgebra-Tagung 2023*, Hannover, Germany

2020 **Würdigungspreis (Appreciation award)** recognizing the 50 best graduates of diploma and master studies at Austrian universities and Fachhochschulen, *Austrian Federal Ministry of Education, Science and Research*, Vienna, Austria

Publications

Journal papers

17. Clemens Hofstadler and Thibaut Verron. *Short proofs of ideal membership*. Journal of Symbolic Computation 125, 102325, 2024. DOI: 10.1016/j.jsc.2024.102325

16. Clemens Hofstadler, Clemens G. Raab, and Georg Regensburger. *Computing Elements of Certain Form in Ideals to Prove Properties of Operators*. Mathematics in Computer Science 16, 19 pages, 2022. DOI: 10.1007/s11786-022-00536-5

15. Clemens Hofstadler and Thibaut Verron. *Signature Gröbner bases, bases of syzygies and cofactor reconstruction in the free algebra*. Journal of Symbolic Computation 113, p. 211–241, 2022. DOI: 10.1016/j.jsc.2022.04.001

14. Dragana S. Cvetković-Ilić, Clemens Hofstadler, Jamal Hossein Poor, Jovana Milošević, Clemens G. Raab, and Georg Regensburger. *Algebraic proof methods for identities of matrices and operators: Improvements of Hartwig's triple reverse order law*. Applied Mathematics and Computation 409, 126357, 10 pages, 2021. DOI: 10.1016/j.amc.2021.126357

Conference papers

13. Maximilian Heisinger and Clemens Hofstadler. *f4ncgb: High Performance Gröbner Basis Computations in Free Algebras*. In: Proceedings of International Workshop on Computer Algebra in Scientific Computing (CASC) 2025, Lecture Notes in Computer Science, vol 16235, pp. 79–97, 2025. DOI: 10.1007/978-3-032-09645-6_5

12. Paul Seip, Johannes Fürnkranz, Florian Beck, Clemens Hofstadler, Peter Pfeiffer, Martina Seidl, Robert Peharz, and Stefan Szeider. *Towards SAT-Based Learning of NNF Networks*. In: Proceedings of International Symposium on Symbolic and Numeric Algorithms for Scientific Computing (SYNASC) 2025, to appear.

11. Daniela Kaufmann and Clemens Hofstadler. *Recycling Algebraic Proof Certificates*. In: Proceedings of International Workshop on Satisfiability Checking and Symbolic Computation 2025, vol 4116, pp. 35–40, 2025. URL: ceur-ws.org/Vol-4116/

10. Andreas Plank, Clemens Hofstadler, Maximilian Heisinger, and Martina Seidl. *Refinement-Based Enumeration of QBF Solutions*. In: Proceedings of 19th European Conference on Logics in Artificial Intelligence (JELIA) Part II, pp. 166–181, 2025. DOI: 10.1007/978-3-032-04590-4_12

9. Clemens Hofstadler and Daniela Kaufmann. *Guess and Prove: A Hybrid Approach to Linear Polynomial Recovery in Circuit Verification*. In: Proceedings of the 31th International Conference on Principles and Practice of Constraint Programming (CP 2025), pp. 14:1–14:22, 2025. DOI: 10.4230/LIPIcs.CP.2025.14

8. Klara Bernauer, Clemens Hofstadler, and Georg Regensburger. *How to Automatise Proofs of Operator Statements: Moore-Penrose Inverse – A Case Study*. In: Proceedings of Computer Algebra in Scientific Computing (CASC) 2023, p. 39–68, 2023. DOI: 10.1007/978-3-031-41724-5_3

7. Clemens Hofstadler and Thibaut Verron. *Signature Gröbner bases in free algebras over rings*. In: Proceedings of International Symposium on Symbolic and Algebraic Computation (ISSAC) 2023, p. 298–306, 2023. DOI: 10.1145/3597066.3597071

6. Cyrille Chenavier, Clemens Hofstadler, Clemens G. Raab, and Georg Regensburger. *Compatible rewriting of noncommutative polynomials for proving operator identities*. In: Proceedings of International Symposium on Symbolic and Algebraic Computation (ISSAC) 2020, p. 83–90, 2020. DOI: 10.1145/3373207.3404047

5. Clemens Hofstadler, Clemens G. Raab, and Georg Regensburger. *Certifying operator identities via noncommutative Gröbner bases*. In: ACM Communications in Computer Algebra 53, 2, p. 49–52, 2019. DOI: 10.1145/3371991.3371996

Preprints

4. Clemens Hofstadler and Viktor Levandovskyy. *Modular Algorithms For Computing Gröbner Bases in Free Algebras*. 27 pages, 2025. arXiv: 2502.11606

3. Clemens Hofstadler, Manuel Kauers, and Martina Seidl. *Symmetries of Dependency Quantified Boolean Formulas*. 32 pages, 2024. arXiv: 2410.15848

2. Clemens Hofstadler, Clemens G. Raab, and Georg Regensburger. *Universal truth of operator statements via ideal membership*. 43 pages, 2024. arXiv: 2212.11662

Other publications

1. Clemens Hofstadler. *Proving Operator Identities with Computer Algebra*. Computeralgebra-Rundbrief Nr. 74, 7 pages, 2024.

Selected talks

Invited talks

- *Algebraic Automated Theorem Proving*, Effective Algebra Days, Limoges, November 2025.
- *Algebraic First-Order Theorem Proving*, Dynaverse Workshop on Algebraic Methods in Dynamics and Particle Physics, Saarbrücken, October 2025.
- *Algebraic Circuit Verification via Local Linearization*, Annual ÖMG-DMV Meeting, Linz, September 2025.
- *Recent Advancements in Noncommutative Gröbner Basis Software*, AADIOS @ Applications of Computer Algebra (ACA) 2025, Heraklion, July 2025.
- *Algebraic First-Order Theorem Proving*, Tagung Fachgruppe Computeralgebra, Leipzig, June 2025.
- *First-order theorem proving for operator statements*, Dagstuhl Seminar 24421: SAT and Interactions, Dagstuhl, October 2024.
- *A semi-decision procedure for proving operator statements*, AADIOS @ Applications of Computer Algebra (ACA) 2023, Warsaw, July 2023.
- *Gröbner bases in the free algebra: Introduction & advanced topics*, Séminaire Calcul Formel, Limoges, January 2023.
- *Automatizing proofs of properties of operators*, AADIOS @ Applications of Computer Algebra (ACA) 2021, online, July 2021.
- *Computing noncommutative Gröbner bases and certifying operator identities*, Algebraic rewriting seminar, online, April 2021.

Contributed talks

- *f4ncgb: High Performance Gröbner Basis Computations in Free Algebras*, CASC 2025, Dubai, November 2025.
- *Short proofs of ideal membership*, Computer Algebra in Scientific Computation (CASC) 2024, Rennes, September 2024.

- *How to Automatise Proofs of Operator Statements: Moore-Penrose Inverse – a Case Study*, Computer Algebra in Scientific Computation (CASC) 2023, Havana, August 2023.
- *Signature Gröbner bases in free algebras over rings*, International Symposium on Symbolic and Algebraic Computation (ISSAC) 2023, Tromsø, July 2023.
- *Automated proofs of operator statements*, International Linear Algebra Society (ILAS) 2023, Madrid, June 2023
- *Automated proofs of operator statements*, Computeralgebra-Tagung 2023, Hannover, June 2023.
- *Computing elements of certain form in ideals to prove properties of operators*, Computer Algebra in Scientific Computing (CASC) 2021, Sochi/online, September 2021.

Teaching

2024 – 2025 **Lecturer in mathematics and artificial intelligence**, Johannes Kepler University Linz, Austria
Bachelor's courses: *Computational Logics for AI, Linear Algebra*
Master's course: *Special Lecture on Gröbner Bases*

2024 – 2025 **Teaching assistant in mathematics and computer science**, Johannes Kepler University Linz, Austria
Bachelor's courses: *Algebra for Computer Science, Computational Logics for AI, Formal Models, Linear Algebra*

2023 **Guest lecturer of special lecture in mathematics**, *together with G. Regensburger*, University of Kassel, Germany
Master's course: *Commutative and Noncommutative Polynomials*

2020 – 2022 **Teaching assistant in mathematics and artificial intelligence**, Johannes Kepler University Linz, Austria
Bachelor's courses: *Mathematics for AI, Mathematics for Statisticians, Discrete Structures*

Supervision

I am currently advising several Bachelor's and Master's students who are working on topics in automated theorem proving, bilateral AI, and noncommutative algebra. The following students have already successfully defended their theses:

Master students

2025 **Peter Krug**, *Undecidability of Noncommutative Ideal Membership and Counterexamples via SAT*, University of Kassel, Germany, defended March 2025

2025 **Christoph Heidemann**, *Noncommutative Gröbner bases over Euclidean domains and the F4 algorithm*, University of Kassel, Germany, defended March 2025

Academic service

ISSAC 2026 Software Presentation Committee
iFM 2025 Artifact Evaluation Committee
FMCAD 2025 Student Forum Program Committee
(Sub-)Reviewer for ISSAC, JSC, SAT, STACS, TOMS

Miscellaneous

Languages German (native), English (fluent), Spanish (basic)
Programming Bash, Python, C, C++
Computer algebra Mathematica, Matlab, Oscar, SageMath, Singular

Linz, 21. Dezember 2025