# Curriculum Vitae

## Cyrille Chenavier

**Date of birth and nationality:** January $3^{rd}$ 1987, French.

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**Employments**

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**since 2021.** Associate professor, University of Limoges, XLIM laboratory.

**2020.** Postdoctoral researcher at Institute for Algebra, Johannes Kepler University, Linz.

**2018-2019.** Postdoctoral researcher, Inria Lille - Nord Europe, Valse team.

**2017-2018.** Attaché temporaire d'enseignement et de recherche, University Paris-Est Marne-la-Vallée, Laboratoire d'Informatique Gaspard-Monge.

**2016-2017.** Attaché temporaire d'enseignement et recherche, University Paris Diderot, Institut de Recherche en Informatique Fondamentale.

**2013-2016.** PhD fellow in Computer Science, University Paris Diderot.
Thesis: *Le treillis de opérateurs de réduction: applications aux bases Gröbner non commutatives et en algèbre homologique*, defended on 09/12/2016.
Advisors: *Yves Guiraud* (Inria - University Paris Diderot) and *Philippe Malbos* (University Claude Bernard Lyon 1).
Reviewers: *Vladimir Dotsenko* and *Jean Goubault-Larrecq*.
President committee: *Pierre-Louis Curien*.
Committee: *Roland Berger*, *Pierre-Louis Curien*, *Vladimir Dotsenko*, *Jean-Charles Faugère*, *Jean Goubault-Larrecq*, *Yves Guiraud*, *Muriel Livernet*, *Philippe Malbos* and *Paul-André Melliès*.
Founded by the project Formalisation du Calcul Algébrique, IDEX Sorbonne-Paris-Cité.

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**Research interests**

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- *Algebraic methods in linear rewriting:* commutative and noncommutative Gröbner bases, completion algorithms, lattice structures and rewriting theory, representations of rewriting systems by reduction operators.

- *Constructive methods in algebra:* effective homological algebra, formal methods for functional systems, symbolic computation and applications to module and operad theories.

## Publications

### Journal papers

1. *Topological closure of formal power series ideals and application to topological rewriting theory*, with Thomas Cluzeau and Adya Musson-Leymarie, Journal of Symbolic Computation, 129, 2025.
2. *Confluence of algebraic rewriting systems*, with Benjamin Dupont and Philippe Malbos, Mathematical Structures in Computer Science, 32(7): 870-897, 2022.
3. *Quotients of the magmatic operad: lattice structures and convergent rewrite systems*, with Christophe Cordero and Samuele Giraudo, Experimental Mathematics, 30(4): 513-530, 2021.
4. *Topological rewriting systems applied to standard bases and syntactic algebras*, Journal of Algebra, 550: 410-431, 2020.
5. *A lattice formulation of the noncommutative $F_4$ procedure*, International Journal of Algebra and Computation, 29(1): 23-40, 2019.
6. *Syzygies among reduction operators*, Journal of Pure and Applied Algebra, 223(2): 721-737, 2019.
7. *Reduction operators and completion of rewriting systems*, Journal of Symbolic Computation, 84: 57-83, 2018.
8. *Confluence algebras and acyclicity of the Koszul complex*, Algebras and Representation Theory, 19(3): 679-711, 2016.

### Conference papers

9. *Formal integrability of partial differential systems: implementation and applications*, with Thomas Cluzeau and Alban Quadrat, to appear in IFAC Symposium on System Structure and Control (SSSC 2025).
10. *Computation of Koszul homology and application to involutivity of partial differential systems*, with Thomas Cluzeau and Alban Quadrat, IFAC Symposium on System Structure and Control (SSSC 2022), hal-03908688.
11. *Compatible rewriting of noncommutative polynomials for proving operator identities*, with Clemens Hofstadler, Clemens G. Raab and Georg Regensburger, International Symposium on Symbolic and Algebraic Computation (ISSAC 2020), arXiv:2002.03626.
12. *A geometric stabilization of planar switched systems*, with Rosane Ushirobira and Giorgio Valmorbida, IFAC World Congress (IFAC 2020), hal-02366928.
13. *Normal forms of matrix words for stability analysis of discrete-time switched linear systems*, with Laurentiu Hetel et Rosane Ushirobira, European Control Conference (ECC 2020), hal-02069712.

### Preprints

14. *Strategies for linear rewriting systems: link with parallel rewriting and involutive divisions*, with Maxime Lucas, arXiv:2005.05764.
15. *Presenting isomorphic finitely presented modules by equivalent matrices: a constructive approach*, with Thomas Cluzeau and Alban Quadrat, hal-02501322.
16. *A constructive version of Warfield's Theorem*, hal-02120656.

## Selected talks

- *Computation of Koszul homology and application to partial differential systems*, Champs algébriques et catégories dérivées day, Limoges, December 2024.
- *Computation of Koszul homology and application to partial differential systems*, Maple Conference 2023, online, October 2023.
- *Computation of Koszul homology and application to partial differential systems*, Conference on Applications of Computer Algebra, Warsaw, July 2023.
- *Computation of Koszul homology and application to partial differential systems*, IFAC Symposium on Systems Structure and Control, Montreal, September 2022.
- *Strategies for linear rewriting systems: link with parallel rewriting and involutive divisions*, Conference on Applications of Computer Algebra, online, July 2021.
- *Compatible rewriting systems and completion for proving operator identities*, International Symposium on Symbolic and Algebraic Computation, Kalamata, July 2020.
- *A geometric stabilization of planar switched systems*, IFAC World Congress, Berlin, July 2020.
- *Normal forms of matrix words for stability analysis of discrete-time switched linear systems*, Conference on Decision and Control, Saint Petersburg, May 2020.
- *Compatible rewriting systems and completion for proving operator identities*, Journées Nationales du Calcul Formel, Luminy, March 2020.
- *An effective version of Warfield's theorem*, Conference on Applications of Computer Algebra, Montreal, June 2019.
- *Reduction operators and completion of rewriting systems*, Journées Nationales du Calcul Formel, Luminy, February 2019.
- *The diamond lemma for free modules*, International Workshop on Confluence, Oxford, June 2018.
- *Reduction operators and completion of rewriting systems*, Conference on Applications of Computer Algebra, Santiago de Compostela, June 2018.
- *Upper-bound of reduction operators and computation of syzygies*, Workshop Higher-Dimensional Rewriting and Applications, Oxford, September 2017.
- *Detecting useless critical pairs*, International Workshop on Confluence, Oxford, September 2017.
- *An algebraic approach to confluence and completion*, International Workshop on Confluence, Obergurgl, September 2016.
- *Reduction operators: rewriting properties and completion*, Workshop Higher-Dimensional Rewriting and Applications, Porto, June 2016.
- *Confluence algebras and acyclicity of the Koszul complex*, Summer school On Quivers: Computational Aspects and Geometric Applications, Kobe, July 2015.
- *Confluence algebras and acyclicity of the Koszul complex*, Workshop Higher-Dimensional Rewriting and Applications, Varsovie, June 2015.
- *Confluence algebras and acyclicity of the Koszul complex*, Workshop Algebras, Operads and Rewriting, Saint-Étienne, October 2014.

## Scientific and administrative responsibilities

**Responsibilities of seminars:**

- computer algebra team of XLIM laboratory seminar (since September 2022),
- algebraic rewriting seminar (online, January 2021-April 2023).

**Responsibilities in conferences and workshops:**

- co-organisor of the $14^{th}$ edition of *Functional equations in Limoges* (March 2024, Limoges, France),
- chair of $12^{th}$ and $13^{th}$ editions of *International Workshop on Confluence* (August 2023, Obergurgl, Austria and July 2024, Tallin, Estonia),
- co-organisor of $11^{th}$ and $12^{th}$ editions of *Workshop of PhD students of XLIM laboratory* (March 2022 and 2023, Limoges, France),
- co-organisor of the $8^{th}$ edition of *Structured matrix days* (May 2022, Limoges, France),
- PC member of $8^{th}$ and $9^{th}$ editions of *International Workshop on Confluence* (June 2019, Dortmund, Germany and June 2020, Paris, France).

**Teaching responsibilities:**

- $2^{nd}$ graduate year, mathematics (since September 2023),
- president of the baccalaureate jury, specialities *Technicien outilleur, Technicien en chaudronnerie industrielle, Technicien usinage, Maintenance des équipements industriels, Procédés de la chimie de l'eau et des papiers cartons, Pilote en ligne de production, Métiers de l'électricité et des ses environnements connectés, Système numérique option B,* (June 2023, Limoges, France).

**Administrative responsibilities:**

- XLIM lab board member (since April 2023),
- jury member of $11^{th}$ and $12^{th}$ Workshop of PhD students of XLIM laboratory (March 2022 and 2023, Limoges, France),
- communication manager of Mathis axis (since 2021).

## Student supervisions

- *Anthony Fraga*, $1^{st}$ year master at University of Limoges, June-August 2024.
  Title: *Introduction to algebraic topology.*
- *Adya Musson-Leymarie*, PhD student at University of Limoges, since October 2023.
  Title: *Algebraic rewriting over topological structures.*
- *Adya Musson-Leymarie*, $2^{nd}$ year master at University of Limoges, March-August 2023.
  Title: *Noncommutative Gröbner bases applied to homological computations.*
- *Arthur LÉONARD*, $1^{st}$ year at École Normale Supérieure de Paris, May-September 2021.
  Title: *Signature-based algorithms for computation of noncommutative Gröbner bases.*
- *Chloé XAINTRAY*, $2^{nd}$ year undergraduate at University Paris Diderot, June-July 2016.
  Title: *Functional interfaces, streams and Gaussian elimination in Java.*

## Teaching

**2021-2025.** Professor assistant, University of Limoges.
Hours: 1054 (lectures, practical works, and tutorials).
Level: undergraduate and master.
Topics: algebra, computer algebra and polynomial systems, differential and vector calculus, Euclidean geometry, Java processing, maths for physicists, probabilities, real and complexe analysis, sequences and series of functions, unix.

**2017-2018.** ATER, University of Paris-Est Marne-la-Vallée.
Hours: 192 (practical works and tutorials).
Levels: school engineering, undergraduate.
Topics: algorithms for data structures, operating systems, programming, syntactic analysis.

**2013-2017.** Moniteur and ATER, University Paris Diderot.
Hours: 352 (lectures, practical works, and tutorials).
Level: undergraduate.
Topics: algorithms for data structures, graphical user interfaces, imperative and object-oriented programming, types and objects.

**Languages/softwares.** Bison, C, Flex, Kotlin, Java, Java Processing, Python, Shell.