

Cécile Armana

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Algebra and Number Theory Group
Laboratoire de Mathématiques de Besançon (UMR CNRS 6623)
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Academic positions

- 2024-... **Maîtresse de conférences HDR (Associate Professor)**, University Marie et Louis Pasteur (formerly University of Franche-Comté), Laboratoire de Mathématiques de Besançon (LmB), France.
- 2012-24 **Maîtresse de conférences (Assistant Professor)**, University Marie et Louis Pasteur (formerly University of Franche-Comté), LmB, France.
- Spring 2012 **Postdoctoral Fellow** at ICERM (Institute for Computational and Experimental Research in Mathematics) for the research semester *Complex and Arithmetic Dynamics*, Brown University, USA.
- 2011–12 **Wissenschaftlicher Mitarbeiterin (Research Fellow)**, University of Münster, Germany, in the research group of Prof. Urs Hartl.
- 2009–11 **Postdoctoral Fellow**, European PostDoctoral Institute for Mathematical Sciences: 11 months (2010) at CRM (Centre de Recerca Matemàtica), Barcelona, Spain (research semester *Arithmetic Geometry*)
3 months at IHÉS (Institut des Hautes Études Scientifiques), Bures-sur-Yvette, France
10 months at MPIM (Max Planck Institut für Mathematik), Bonn, Germany.
- 2008–09 **Lavoisier Postdoctoral Fellow**, funded by the French Ministry of European and Foreign Affairs. University of Saarland, Saarbrücken, Germany, in the research group of Prof. Ernst-Ulrich Gekeler.
- 2007–08 **ATER (Instructor)**, University Paris 6, Mathematics Department and Institut de Mathématiques de Jussieu, France.
- 2006–07 **ATER (Instructor)**, University Paris 7, Mathematics Department and Institut de Mathématiques de Jussieu, France.
- 2003–06 **Monitrice (Teaching Assistant)**, University Paris 7, Mathematics Department and Institut de Mathématiques de Jussieu, France.

Education

- 2024 **Habilitation à diriger des recherches**, University of Franche-Comté, France. Title: *Contributions à l'étude des formes modulaires sur les corps de fonctions*.
- 2003–08 **Doctorat (Ph.D.) in Mathematics**, University Paris 7, France. Title: *Torsion rationnelle des modules de Drinfeld*. Advisor: Loïc Merel. November 2008.
- 2002–03 **DEA (Master degree) in mathematics** with major in “Méthodes algébriques” (Algebraic methods), University Paris 6, France. Ranked 4 out of 37.

Research interests

Number theory, arithmetic geometry

Function field arithmetic, Drinfeld modules, Drinfeld modular curves. Elliptic curves, automorphic forms, modular forms, modular symbols and explicit aspects. Abelian varieties, Galois representations.

Publications

Full-text versions are available on my webpage: <http://armana.perso.math.cnrs.fr>

- [0] C. Armana. *Torsion rationnelle des modules de Drinfeld*. **PhD Thesis**, University Paris 7, 2008, 135 pages, in French. ▷ Full-text access.
- [1] C. Armana. *Torsion des modules de Drinfeld de rang 2 et formes modulaires de Drinfeld*. **C. R. Math. Acad. Sci. Paris**, 347(13-14) : 705–708, 2009. ▷ Published version.
- [2] C. Armana. *Sur les symboles modulaires de Manin-Teitelbaum pour $\mathbb{F}_q(T)$* . **C. R. Math. Acad. Sci. Paris**, 347(15-16) : 845–848, 2009. ▷ Published version.
- [3] C. Armana. *Coefficients of Drinfeld modular forms and Hecke operators*. **J. Number Theory**, 131(8) : 1435–1460, 2011. ▷ Published version.
- [4] C. Armana. *Torsion des modules de Drinfeld de rang 2 et formes modulaires de Drinfeld*. **Algebra Number Theory**, 6(6) : 1239–1288, 2012. Extended version of the note [1] with proofs and improvements. ▷ Published version.
- [5] S. Arias-de-Reyna, C. Armana, V. Karemaker, M. Rebolledo, L. Thomas, et N. Vila. *Galois representations and Galois groups over \mathbb{Q}* . In **Women in numbers Europe. Research directions in number theory. Based on the presentations at the WINE workshop, Luminy, France, October 13–18, 2013**, pages 191–205. Cham: Springer, 2015. ▷ Published version.
- [6] C. Armana. *Une base explicite de symboles modulaires sur les corps de fonctions*. **J. Reine Angew. Math.**, 717:101–132, 2016. Extended version of the note [2] with proofs and substantial improvements. ▷ Published version.
- [7] S. Arias-de-Reyna, C. Armana, V. Karemaker, M. Rebolledo, L. Thomas, et N. Vila. *Large Galois images for Jacobian varieties of genus 3 curves*. **Acta Arith.**, 174(4) : 339–366, 2016. ▷ Published version.
- [8] C. Armana, F.-T. Wei. *Sturm-type bounds for modular forms over function fields*. **J. Number Theory**, 237 (August 2022): 67–98, 2022. ▷ Published version.
- [9] B. Anglès, C. Armana, V. Bosser, F. Pazuki. *Drinfeld modular singuli, hyperbolas, units*. **Preprint**, April 2024, 41 pages. ▷ Preprint version.
- [10] C. Armana. *Non-perfect pairings between Hecke algebra and modular forms over function fields*. **Preprint**, August 2024, 21 pages. ▷ Preprint version.
- [11] C. Armana, S.-Y. K. Ho, M. Papikian. *Ogg’s conjectures over function fields*. Expository paper. **Preliminary version**, September 2024, 40 pages. ▷ Preprint version.
- [12] C. Armana. *Contributions à l’étude des formes modulaires sur les corps de fonctions, 2024*. **Habilitation à diriger des recherches** thesis. In French, 80 pages. ▷ Full-text access.

Master and doctoral supervisions

2019-23 **Co-advisor of the PhD thesis of Valentin Petit (LmB)** with Christophe Delaunay. Defended in May 2023. The thesis has resulted in two papers:

V. Petit. *Non-divisible point on a two-parameter family of elliptic curves*. Research in Number Theory 8 (2022).

V. Petit. *Explicit computation of the modular parametrization of elliptic curves over function fields by Drinfeld modular curves*. Preprint (June 2022).

2013-24 Supervisor for **4 Master theses** in Number Theory, LmB (Yann-Vivian Silvert 2013, Tony Mathieux 2016, Valentin Petit 2019, Corentin Wolff 2024).

2018-... **Master and doctoral training** in developing countries, mainly Sub-Saharan Africa: **Mini master courses** (typically between 6 and 10 hours) during research schools. Topics: Elliptic curves, Modular forms, Algebraic Number Theory, Introduction to SageMath. Countries: Democratic Republic of Congo 2018, Senegal 2021 and 2022, Benin 2022, Gabon 2022 and 2024.

Supervision of groups of participants during *Women in Sage in Senegal* 2021 and *Women in Sage in Nigeria* 2022. **Online** talks.

Fellowships and awards

2024–26 Award for **Outstanding Research Work and Doctoral Supervision** (RIPEC 3), University of Franche-Comté.

2015–19 Award for **Outstanding Research Work and Doctoral Supervision** (Prime d'encadrement doctoral et de recherche), University of Franche-Comté.

2013 **Junior Research Grant** (Bonus Qualité Recherche), University of Franche-Comté.

2009–11 **European PostDoctoral Institute Fellowship**, IHÉS.

Two-year research grant awarded by a consortium of nine European research institutes. Only seven grants are awarded for 2009–2011.

Projects funded

2021-22 SENAREX project *Écoles sénégalaises en arithmétique et mathématiques explicites*, with Bernadette Faye, 15,000€. Organization of a series of research schools in Senegal, funded by **CNRS**.

Research stays and invitations abroad

Postdoctoral positions are not included in the list.

2020 National Center for Theoretical Sciences, Hsinchu, **Taiwan**
2 weeks, invitation from Prof. F.-T. Wei

2018 National Center for Theoretical Sciences, Taipei, Taiwan
4 weeks, invitation from Prof. F.-T. Wei

2016 Academia Sinica, Taipei, Taiwan
2 weeks, invitation from Prof. F.-T. Wei and Prof. Jing Yu

2009 Universität Duisburg-Essen, Department of Mathematics, **Germany**
1 week, invitation from Prof. Gebhard Böckle

2006 Georg-August-Universität, Mathematisches Institut, Göttingen, Germany
4 weeks during the Clay Mathematics Institute Summer school *Arithmetic Geometry*

Recent talks and invitations

Talks prior to 2012 are not included in the list.

2024 African-European online *Seminar REDAGAAC*.

- 2024 *Gabonese Workshop in Arithmetic and beyond*, Libreville, **Gabon**
- 2024 *Number theory seminar*, **Toulouse**, France
- 2024 CAIPI Symposium (Correcting codes, Cryptography, Arithmetic Geometry and their computational aspects), **Marseille**, France
- 2023 HMI workshop *Explicit methods in automorphic forms and arithmetic geometry*, **Dublin**, Ireland
- 2022 *Troisièmes Journées arithmétiques du Gabon*, Libreville, Gabon
- 2022 Conference \mathbb{N}^3 days XVI, **Copenhagen**, Denmark
- 2022 Conference *Geometric and Arithmetic Methods in Number Theory*, **Besançon**, France
- 2021 *Research School in Number Theory and Applications*, Porto-Novo, **Benin** (online)
- 2021 Rencontre de théorie des nombres, **Clermont-Ferrand**, France
- 2021 LFANT Seminar, **Bordeaux**, France, online
- 2020 **CMS Annual Meeting**, *Session on Computations with Arithmetic Groups*, online
- 2020 **AMS Fall Eastern Virtual Sectional Meeting**, *Special Session on Drinfeld modules, Modular Varieties and Arithmetic Applications*, online
- 2020 Number Theory Seminar, National Center for Theoretical Sciences, **Hsinchu, Taiwan**
- 2020 Number Theory Seminar, **Grenoble**, France
- 2019 Conference *Fifth mini symposium of the Roman Number Theory Association*, **Roma, Italy**
- 2019 *AIMS-Stellenbosch Number Theory Conference 2019*, **Stellenbosch, South Africa**
- 2019 Meeting I-SITE Besançon-Dijon *Motivic Invariant of Algebraic Varieties*, Besançon, France
- 2018 Colloquium, National Central University, Taoyuan, Taiwan
- 2018 Number Theory Seminar, National Center for Theoretical Sciences, Taipei, Taiwan
- 2016 Arithmetic Geometry seminar, Taida Institute for Math. Sciences, Taipei, Taiwan
- 2016 Number Theory seminar National Center for Theor. Sciences, Hsinchu, Taiwan
- 2016 Joint Number Theory Seminar, Grenoble, France
- 2016 Algebra and Number Theory Seminar, LmB, Besançon, France
- 2013 Workshop *Pro-p-groups and arithmetic*, LmB, Besançon, France
- 2012 Algebraic Geometry Seminar, IRMAR, University of **Rennes**, France
- 2012 Conference *Zeta functions and L-series in positive characteristic*, CRM **Pisa, Italy**
- 2012 Penn State–Göttingen *Number Theory Conference*, **Göttingen, Germany**
- 2012 Algebra and Number Theory Seminar, **Penn State University, USA**
- 2012 Conference *Number Theory and Applications*, **CIRM, Marseille**, France

Research projects and networks

Projects which I am (or was) a member of:

- 2022-25 **ANR project** PadLEfAn *Fonctions L : aspects p-adiques, analytiques et effectifs*
- 2021-25 **International Research Network AFRIMath**, funded by **CNRS**, which brings together mathematicians from Sub-Saharan Africa and France mostly.
- 2021-24 **ANR project** JINVARIANT *Arithmetic of the j-invariant*
- 2021-22 SENAREX project *Écoles sénégalaises en arithmétique et mathématiques explicites*, series of research schools in Senegal, funded by **CNRS**

- 2019-... International network GDRI GANDA *Geometry and Arithmetic* between France, Denmark, Madagascar and South Africa, funded by **CNRS**.
- 2012-... French National network in Number Theory (RT2N) by **CNRS**.
- 2018-21 Research project **I-SITE BFC** MIAV: *Motivic Invariants of Algebraic Varieties*, joint with the University of Bourgogne
- 2017-21 **ANR** project FLAIR *Familles de fonctions L : analyse, interactions, résultats effectifs*
- 2014-16 Research project *Méthodes explicites et algorithmiques en arithmétique dans le cadre d'un partenariat Besançon-Amérique du Nord* (LmB, funded by the Région Franche-Comté)

Scientific expertise

▷ On an international level

- 2025-... Member of the **Governing Board of CIMPA**. The CIMPA, Centre International de Mathématiques Pures et Appliquées, supports the organization of mathematics courses and research schools in developing countries.
- 2024-... Co-coordinator of the research network *Arithmetic and Geometry in Central Africa* **REDAGAAC**.
- 2023-... **Representative of CIMPA** for the committee which evaluated the proposals of African Mathematical Schools
- 2021-... **Co-supervisor** of the *Number theory and Information Theory* theme for the International Research Network (IRN) AFRIMath, CNRS.

▷ On a national level

- 2016-19 Member of the **French National Commission** which decides national promotions
- 2024-27 and sabbatical leaves for mathematicians in French universities (CNU 25).
- 2016, 18, 21, 22, 24 **Committee member for nine PhD candidates**: Charlotte Euvrard and Marine Rougnant (LmB), Elie Eid (Rennes), Quentin Gazda (St-Étienne), Huy Hung Le (Caen), Mohamed El Kati (Besançon), Tiphaine Beaumont (Caen), Antoine Leudière (INRIA Nancy), Zoé Yvon (Marseille).
- 2019-23 Member of the **Scientific Committee** of the French national research network GDR *Jeunes Chercheuses et Jeunes Chercheurs en Arithmétique* (Young Researchers in Arithmetic), funded by CNRS.
- 2014-... Member of **15 Hiring Committees** for Assistant Professorships in French universities (Besançon, Cergy, Clermont-Ferrand, Lyon, Marseille, Grenoble, Toulouse).
- 2016 **Referee** for a project submitted to the Qatar National Research Fund

▷ On a local level

- 2023-... Member of the **Gender equality committee** (comité parité) of the LmB
- 2015-19 Member of the **Steering Committee** and **Scientific Council** (Conseil de Laboratoire and Conseil scientifique) of the LmB.

▷ On scientific literature and publishing

- 2024-... **Assistant Editor-in-Chief** of the open access **journal** *Publications mathématiques de Besançon, Algèbre et Théorie des Nombres* (from 2019 to 2024: member of the Scientific committee).
- 2021-... Member of the **Steering Committee** for the French **Research Network of Mathematical Libraries** (RNBM)

- 2013-20 **Scientific supervisor of the Mathematical Library** of the LmB.
- 2010-... **Referee** for *books*: Lecture Notes in Mathematics, and for *journals*: Bulletin of the Korean Mathematical Society, Contemporary Mathematics (AMS), Crelle's Journal, International Journal of Number Theory, Journal of Algebra, Journal of Number Theory, Mathematics of Computation, Münster Journal of Mathematics, Nagoya Mathematical Journal, Proceedings of the AMS, Publications Mathématiques de Besançon, Research in Number Theory. See also my ORCID profile, section *Peer Review*.

Organization of scientific events

▷ International conferences and schools

- 2024 Co-organizer of the **Gabonese Workshop in Arithmetic and Beyond**, ENS Libreville, Gabon. Two weeks, about 40 participants.
- 2024 Co-organizer of the **Fourth Algebraic Days of Gabon**, ENS Libreville, Gabon. Two weeks, about 30 participants.
- 2022 Co-organizer of the **Third Algebraic Days of Gabon**, ENS Libreville, Gabon. Two weeks, about 30 participants.
- 2022 Co-organizer and scientific coordinator of the **CIMPA Research School in Senegal**, *Cryptography, theoretical and computational aspects of Number Theory*. Two weeks, about 40 participants.
- 2021 Co-organizer and member of the scientific committee of the **African Mathematical School in Senegal**, *Introduction to Number Theory, Cryptography and related courses*. Two weeks, 40 participants.
- 2019 Co-organizer of the **conference “Zeta Functions”** in CIRM, France. One week, about 80 participants.
- 2019 Co-organizer and scientific coordinator of the **CIMPA Research School in Haiti** *Cryptography, theoretical and computational aspects of algebraic number theory and algebra*. The school had to be cancelled at the last minute for safety reasons.
- 2018 Co-organizer and scientific coordinator of the **CIMPA Research School in the Democratic Republic of Congo**, *Arithmetic, algorithmic and cryptography*. Two weeks, about 50 participants.
- 2018 Main organizer of the **École jeunes chercheurs en théorie des nombres**, LmB, Besançon, France. One-week summer school for young number theorists. About 50 participants.
- 2013 Co-organizer of the **Period “Méthodes algébriques et explicites en théorie des nombres”** during the LmB research program *Méthodes arithmétiques et applications*. International research school (about 30 participants) and conference (about 40 participants).
- 2009 Organizer of a **Workshop on Number Theory**, Saarbrücken, Germany. Two-day international workshop for young number theorists. Seven speakers, about fifteen participants.

▷ Seminars

- 2021-22 Co-organizer with Tony Ezome of the **online seminar** Number Theory and Information Theory of the international research network IRN **AFRIMath**.
- 2013-18 Co-organizer of the **Algebra and Number Theory Seminar**, LmB, Besançon.
- 2005–07 Co-founder and co-organizer of the **Graduate Student Seminar**, Institut de Mathématiques de Jussieu.

Teaching experience

2003-... Teaching experience in **mathematics at all French university levels**: bachelor degree, master degree, preparation to competitive exams for future high school teachers. *Since 2012, about 200 teaching hours per year.*

2017-18 **Six-month sabbatical leave** (“délégation CNRS à mi-temps”).

▷ **Academic service**

2022-... **Head of the Magistere Degree program** in Mathematics, University of Franche-Comté

2018-21 **Head of the Master Degree program** *General mathematics*, University of Franche-Comté

This program provides a Master degree for a high-level general education in Mathematics. It is intended to prepare students to the competitive exam for becoming a mathematics teacher in French junior high schools and high schools (“agrégation de mathématiques”).

Outreach activities in mathematics and sciences

2024 Co-organizer of the yearly **Mathematics Research Discovery Day** of LmB, which hosted about 250 high school students. Participant of the previous sessions since 2012: creation and display of mathematical workshops for students.

2023 **Conferences** *In the daily life of a math researcher* for high school students.

2018-... **In charge of the regional execution** of the *Plan Villani-Torossian pour l'enseignement des mathématiques*, **National French program for improving mathematics teaching** in elementary schools, junior high schools and high schools.

2014-... Involvement in the **National Outreach Day for Science in France** (*Fête de la Science*): creation of mathematical posters, organization and display of mathematical workshops for the general public.