

Elena Berardini

Curriculum Vitae et Studiorum

Mathematical Institute of Bordeaux
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France

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Personal Information

Name Elena Berardini
Date 11th July 1991
Nationality Italian
Title Ph.D. in Mathematics

Current Position

Since 05/23 **Chaire de Professeur Junior CNRS (tenure-track research associate)**, *Number Theory research team, Mathematical Institute of Bordeaux, France.*

Previous Positions

- 02/22–04/23 **Postdoctoral Researcher (Marie Curie fellow)**, *Mathematical Communication Theory group, Eindhoven University of Technology, The Netherlands.*
Grant of the [EuroTechPostDoc2 Marie Skłodowska–Curie fellowship](#).
- 09/21–01/22 **Postdoctoral Researcher**, *Information Processing and Communications Laboratory, Télécom Paris, France.*
Grant of the [Fondation Mathématiques Jacques Hadamard](#).
- 09/20–08/21 **Postdoctoral Researcher**, *LIX, École Polytechnique, Paris, France.*
Project funded by the French DGA (Direction Générale de l'Armement).
- 09/19–08/20 **Visiting assistant professor (ATER 100%–Attachée Temporaire d'Enseignement et de Recherche)**, *Aix–Marseille University, Marseille, France.*

Publications

- [1] Elena Berardini and Jade Nardi. Curves on Frobenius classical surfaces in \mathbb{P}^3 over finite fields. *Acta Arithmetica*, 205:323–340, 2022.
- [2] Simon Abelard, Elena Berardini, Alain Couvreur, and Grégoire Lecerf. Computing Riemann-Roch spaces via Puiseux expansions. *Journal of Complexity*, page 101666, 2022.
- [3] Elena Berardini and Alejandro J. Giangreco-Maidana. Weil polynomials of abelian varieties over finite fields with many rational points. *International Journal of Number Theory*, 18:1591–1603, 2022.

- [4] Yves Aubry, Elena Berardini, Fabien Herbaut, and Marc Perret. Bounds on the minimum distance of algebraic geometry codes defined over some families of surfaces. *Contemporary Mathematics*, 770, 2021.
- [5] Yves Aubry, Elena Berardini, Fabien Herbaut, and Marc Perret. Algebraic geometry codes over abelian surfaces containing no absolutely irreducible curves of low genus. *Finite Fields and Their Applications*, 70:101791, 2021.

Preprints

- 10/2023 [Structure of CSS and CSS-T Quantum Codes](#), with A. Caminata and A. Ravagnani
- 03/2023 [Algebraic Geometry codes in the sum-rank metric](#), with X. Caruso
- 08/2022 [A proof of the Brill–Noether method from scratch](#) with A. Couvreur and G. Lecerf

Education

- 2016–2020 **Ph.D in Mathematics**, *Aix-Marseille University*, Marseille, France.
 Defense: June 18, 2020
 Title: *Algebraic geometry codes from surfaces over finite fields*
 Supervisors: Yves Aubry and David Kohel
- 2015–2016 **Master 2 in Mathematics**, *Aix-Marseille University*, France.
 Master in Discrete Mathematics and Computer Science Foundations
 Thesis: Maximum number of rational points of genus 3 curves over finite fields
 Supervisor: Yves Aubry
 Final mark: first of the master, mention “Très bien”
- 2014–2016 **M.Sc. in Mathematics cum laude**, *Roma Tre University*, Italy.
 Grant for the “Double Degree French-Italian” project
 Thesis: Numero massimo di punti razionali sulle curve di genere 3 sui campi finiti (Maximum number of rational points of genus 3 curves over finite fields)
 Supervisors: Yves Aubry and Francesco Pappalardi
 Final mark: 110/110 cum laude
- 2014–2016 **ASTRE Diploma**, *Roma Tre University*, Italy.
 Grant for the project “Discover and undertake: facing the challenges of a new world”
 ASTRE or “Alta Scuola Roma Tre” is an interdisciplinary two-year school. Students, 40 per two-year period, are selected on merit, from among those enrolled in the first year of master’s degree courses at Roma Tre University.
- 2010–2013 **Bachelor’s Degree in Mathematics**, *La Sapienza University of Rome*, Italy.
 Thesis: Equilibri di giochi statici (Equilibria of static games)
 Supervisor: Annalisa Malusa
- 2005–2010 **Scientific High School Degree**, *Liceo Scientifico Augusto Righi*, Rome, Italy.

Funding, grants and awards

- 2022 Best presentation award at the [Contemporary and Geometric Techniques in Coding Theory and Cryptography](#) (€500)
- 2022 [EuroTech Postdoc2](#) Marie Skłodowska-Curie fellowship of two years
- 02/2022 Grant for participating to the conference [Francophone Computer Algebra Days](#) at CIRM, Marseille (France) (€500)
- 2021 Postdoc fellowship of two years from [Fondation Mathématique Jacques Hadamard](#) (declined after 5 months)
- 2020 Postdoc grant of 16 months from Inria Paris–Saclay (declined)
- 2020 Postdoc grant of 1 year from the French “Direction Générale de l’Armement”
- 06/2017 ELSEVIER grant for participating to the conference "Finite Fields and Their Applications - Fq13" at Gaeta (Italy) (€400)
- 2015–2016 One year grant for the French-Italian double diploma within the University of Aix-Marseille and the University of Roma Tre (€5000)
- 2014–2016 Two-year excellence grant from ASTRE, University of Roma Tre (€1200)

Talks

As Invited Speaker in Conferences

- 08/09/2023 *From curves to surfaces: a walk through Algebraic Geometry codes*, [Academy Contact Forum "Coding Theory and Cryptography IX"](#), Brussels (Belgium)
- 14/07/2023 *Computing Riemann-Roch Spaces for Algebraic Geometry Codes*, Multivariate Polynomials, Ideals, and Modules: Algorithms and Applications Workshop, [SIAM AG23](#), Eindhoven (The Netherlands)
- 13/06/2023 *Algebraic Geometry codes in the sum-rank metric*, Computational Number Theory Workshop, [FoCM 2023](#), Paris (France)
- 02/11/2021 *Algebraic Geometry codes: construction and applications*, [Journées de Théorie des Nombres et Cryptographie de Valenciennes](#), Université Polytechnique Hauts-de-France
- 26/08/2019 *Bounds for the minimum distance of algebraic geometry codes over surfaces*, [MANTA International Workshop](#), Nogaro, France

In Research Seminars

- 25/05/2023 *Algebraic Geometry codes in the sum-rank metric*, [Number Theory seminar](#), Mathematical Institute of Toulouse, France
- 04/04/2023 *An introduction to Algebraic Geometry codes*, ICTLab group meeting, Eindhoven University of Technology, The Netherlands
- 22/03/2023 *On the number of rational points of curves over a surface in \mathbb{P}^3* , [Algebra and Geometry seminar](#), Genova, Italy
- 15/12/2022 *Nombre de points rationnels des courbes sur une surface de \mathbb{P}^3* , Arithmetic and Information Theory team seminar, Marseille, France

- 16/11/2022 *On the number of rational points of curves over a surface in \mathbb{P}^3* , [Sabanci Algebra Seminar](#), Istanbul, Turkey (online)
- 23/09/2022 *Nombre de points rationnels des courbes sur une surface de \mathbb{P}^3* , [Number Theory seminar](#), Bordeaux, France
- 07/06/2022 *Computing Riemann-Roch spaces for algebraic geometry codes*, [ACCESS online seminar](#)
- 26/04/2022 *Nombre de points rationnels des courbes sur une surface de \mathbb{P}^3* , Team IAA seminar, IMATH, Toulon, France (online)
- 06/04/2022 *Computing Riemann-Roch spaces for Algebraic Geometry codes*, [Coding theory and Cryptography seminar](#), Zurich (online)
- 17/03/2022 *Computing Riemann-Roch spaces for AG codes*, Team CAS3C3 Seminar, JLK, Grenoble (online)
- 10/03/2022 *Computing Riemann-Roch spaces for AG codes*, Computer Algebra seminar, XLIM, Limoges (online)
- 08/03/2022 *Computing Riemann-Roch spaces for AG codes*, LFANT seminar, Bordeaux (online)
- 25/02/2022 *AG codes from curves and surfaces*, Number Theory seminar, Laboratoire de Mathématiques Nicolas Oresme, Caen, France
- 19/11/2021 *Calcul d'espaces de Riemann-Roch pour les codes géométriques*, [Effective Geometry and Algebra Seminar](#), IRMAR, Rennes
- 12/10/2021 *Computing Riemann-Roch spaces for algebraic geometry codes*, Cyber-Crypto Seminar, Télécom Paris
- 20/05/2021 *Variétés abéliennes maximales sur les corps finis et cyclicité*, ATI Seminar, Mathematics Institute of Marseille, Marseille, France
- 23/03/2021 *Variétés abéliennes maximales et cyclicité*, IAA Seminar, Mathematics Institute of Toulon, Toulon, France
- 17/11/2020 *Étude théorique de codes géométriques sur des familles de surfaces algébriques*, GRACE Team Seminar, Inria, École Polytechnique, France
- 27/10/2020 *Algebraic geometric codes from surfaces over finite fields*, MAX Team Seminar, LIX, École Polytechnique, Paris, France
- 16/10/2020 *Codes géométriques sur des familles de surfaces*, Number Theory Seminar, IMB, Mathematical Institute of Bordeaux, Bordeaux, France
- 10/01/2020 *Codes algébriques géométriques sur des familles de surfaces*, GAE Seminar, IRMAR, Mathematical Research Institute of Rennes, Rennes University 1, Rennes, France
- 21/11/2019 *Codes algébriques géométriques sur des familles de surfaces*, ATI Seminar, Mathematics Institute of Marseille, Aix-Marseille University, Marseille, France
- 29/05/2018 *Codes over abelian surfaces*, JAWS, Mathematics Institute, Warwick, England
- 23/01/2018 *Codes sur les surfaces abéliennes*, Team Seminar, Mathematics Institute of Toulon, Toulon, France
- 29/05/2017 *Tout ce que vous avez toujours voulu savoir sur les courbes algébriques (sans jamais oser le demander)*, PhD students Seminar, Mathematics Institute of Marseille, Aix Marseille University, France

In Conferences

- 09/06/2023 *Algebraic Geometry codes in the sum-rank metric*, [Arithmetic, Geometry, Cryptography and Coding Theory](#), CIRM, Marseille, France
- 14/02/2023 *On the number of rational points of curves over a surface in \mathbb{P}^3* , [COGNAC](#), CIRM, Marseille, France
- 25/01/2023 *Classical linear codes problem for quantum computation*, [Dutch–Belgian Discrete Math Seminar](#), Ghent, Belgium
- 24/11/2022 *Weil polynomials of abelian varieties over finite fields with many rational points*, [DIAMANT Symposium Autumn 2022](#), Leiden, The Netherlands
- 29/08/2022 *On the number of rational points of curves over a surface in \mathbb{P}^3* , [Finite Geometries](#), Irsee, Germany
- 18/07/2022 *Computing Riemann–Roch spaces for Algebraic Geometry codes*, [Contemporary and Geometric Techniques in Coding Theory and Cryptography](#), Università degli Studi della Campania Luigi Vanvitelli, Italy (virtual)
- 12/07/2022 *Computing Riemann–Roch spaces for Algebraic Geometry codes*, [Coding theory and cryptography, A conference in honor of Joachim Rosenthal's 60th birthday](#), Zurich, Switzerland
- 31/05/2022 *On the number of rational points of curves over a surface in \mathbb{P}^3* , [Combinatorics](#), Mantoue, Italy
- 01/03/2022 *Computing Riemann–Roch spaces via Puiseux expansions*, [Francophone Computer Algebra Days](#), CIRM, Marseille, France
- 21/09/2021 *Riemann–Roch spaces and algebraic geometry codes*, [Cryptography and Coding Theory First Annual Conference](#), (virtual)
- 04/06/2021 *Computing Riemann–Roch spaces of plane curves via Puiseux expansions*, [AGC²T](#), CIRM (virtual)
- 01/06/2021 *Algebraic geometry codes from surfaces over finite fields*, [PhD Students in Number Theory Day](#), Italy (virtual)
- 01/03/2021 *Espaces de Riemann–Roch : calcul et applications*, [National Days of Computer Algebra](#), CIRM, Marseille, France
- 04/07/2019 *Abelian surfaces containing no absolutely irreducible curves of low genus and AG codes*, [Journées Arithmétiques XXXI](#), Istanbul, Turkey
- 14/06/2019 *AG codes over abelian surfaces containing no absolutely irreducible curves of low genus*, [AGC²T](#), CIRM, Marseille, France
- 03/06/2019 *AG codes over abelian surfaces containing no absolutely irreducible curves of low genus*, [Finite Fields and their Applications 14](#), Vancouver, Canada
- 10/04/2019 *AG codes over abelian surfaces with special reference to Weil Restrictions of elliptic curves*, [Fifth Symposium of the Roman Number Theory Association](#), Rome, Italy
- 22/11/2017 *Codes Correcteurs d'Erreur (ou comment j'ai appris à m'en faire et à aimer la crypto)*, [17^e Forum des Jeunes Mathématicien-ne-s](#), Institut Elie Cartan de Lorraine, Nancy, France

In Workshops

- 18/12/20 *AG Codes: when algebraic geometry meets coding theory*, [Workshop Oisillon](#), Inria, École Polytechnique
- 24/10/19 *Involutions, Quaternion Algebras Workshop*, ATI Team, Aix-Marseille University
- 09/05/19 *Modular functions and singular j -invariants*, Number Theory Workshop on Cox's book "Prime of the form $x^2 + ny^2$ ", ATI Team, Aix-Marseille University
- 07/02/19 *The Hilbert Class Field and Genus Theory*, Number Theory Workshop on Cox's book "Prime of the form $x^2 + ny^2$ ", ATI Team, Aix-Marseille University
- 10/01/18 *Codes sur des surfaces abéliennes*, [Manta Full Retreat](#), Domaine du meunier, France

Scientific Activities

- 2021– Member of the French research project ANR [BARRACUDA](#), a four-year project focused on cryptographic problems requiring the introduction of advanced algebraic structures and/or techniques, such as distributed storage, multiparty computation or zero-knowledge proofs.
- 2016–2019 Member of the research project [ANR Manta](#), a four-year project focused on algebraic geometry and advanced algebraic coding theory, with applications to theoretical computer science and cryptography.

Reviewing activities

- Since 2023 Reviewer for [Designs, Codes and Cryptography](#)
- Since 2022 Reviewer for [Applicable Algebra in Engineering, Communication and Computing](#) and [MathSciNet](#)
- 2022 Reviewer for [MEGA 2022](#)
- Since 2021 Reviewer for [Journal of Algebra and Its Applications](#)

Activities for the community

- Since 2023 **Co-organizer of the CAIPI symposium**, *France*.
- Since 2016 **Member of the GDS Audimath (Groupement de Services : Autour de la Diffusion des Mathématiques)**, *created by the CNRS' Institut National Sciences Mathématiques et de leurs Interactions (INSMI)*.
- Since 2015 **Member of the Pi Day association**, *for promotion and communication of Mathematics to the general public*.
The association is laureate of the d'Alembert Prize 2016 awarded one time every two years by the Société Mathématique de France, and of the Trophée Phocéén Étudiant 2016 for students initiatives awarded by the city of Marseille.

Teaching Activities

Students

- since 09/23 **Fabrice Drain**, *Ph.D. student*, Mathematical Institute of Bordeaux, France, co-supervised with X. Caruso.
Fabrice is working on the decoding of AG codes in the sum-rank metric
- since 09/23 **Adrien Pasquereau**, *Ph.D. student*, University of St. Gallen, Switzerland, co-supervised with A.-L. Horlemann.
Adrien is working on various topics related to AG codes and their applications.

02/22-09/22 **Lenka Bachoríková**, *Master student*, Eindhoven University of Technology, The Netherlands, co-supervised with A. Ravagnani.
Thesis: Hamming-Metric Codes for Quantum Channels, defended on October 5, 2022.

Courses

2021–2022 **Télécom Paris**, *Paris*, France.

- Basis of calculus (special exercise sessions)

2019–2020 **Aix–Marseille University**, *Marseille*, France.

- **Lectures + Exercise sessions:** Linear algebra for first year students in Mathematics Bachelor (78h)
- **Course leader + lectures** “Passerelle pour les Mathématiques”, introductory course for first year students in Mathematics Bachelor (36h)
- **Exercise sessions:** Geometry for second year students in Mathematics Bachelor (36h)
- **Stage Hippocampe:** Geometric representation of calculus (tutor - 24h)

2018–2019 **Aix–Marseille University**, *Marseille*, France.

- **Exercise sessions:** Geometry for second year students in Mathematics Bachelor (36h)
- **Lectures:** “Passerelle pour les Mathématiques”, introductory course for first year students in Mathematics Bachelor (18h)
- **Stage Hippocampe:** Geometric modelling for computer science (tutor - 12h)

2017–2018 **Aix–Marseille University**, *Marseille*, France.

- **Lectures + Exercise sessions:** Geometry and arithmetic for first year students in Mathematics/Computer science Bachelor (45h)
- **Lectures:** “Passerelle pour les Mathématiques”, introductory course for first year students in Mathematics Bachelor (20h)

2016–2017 **Aix–Marseille University**, *Marseille*, France.

- **Exercise sessions:** Calculus I for first year students in Mathematics/Computer science Bachelor (18h)
- **Exercise sessions:** Calculus for first year students in Biology (26h)
- **Stage Hippocampe:** Error-correcting codes theory (tutor - 12h)
- **Stage Hippocampe:** Mathematical imagination (tutor - 12h)

2014–2015 **Roma Tre University**, *Rome*, Italy.

- **Exercise sessions:** Advanced Calculus for second year students in Mathematics Bachelor (30h)

Outreach Activities

Publications

- [1] E. Berardini, J. Cohen, G. Geoffroy, A. Iezzi, Pi Day: An International Festival of Mathematics, EMS Newsl. 3 (2018),36-37, <https://doi.org/10.4171/NEWS/107/8>

Organization of events

- 03/2018 Co-organiser of **Pi Day 2018** - Mathematics Institute, Marseille (150 people)
- 03/2017 Co-organiser of **Tournée de π 2017** - Théâtre des Variétés, Paris (800 people), Théâtre Le Silo, Marseille (800 people), Théâtre Le Transbordeur, Lyon (400 people)
- 03/2016 Co-organiser of **Pi Day 2016** - Théâtre National de la Criée, Marseille (700 people).

Other activities

- 11/2017 Participation to the workshop *Writing* within the framework of GdS Audimath, for the drafting of articles about scientific popularization, IHP, Paris
- 2016–2017 Participation to the drafting of the comedy *From Marseille to Vegas*, played during the *Tournée de π* at Théâtre des Variétés, Paris (14/03/2017), Théâtre Le Silo, Marseille (16/03/2017), Théâtre Le Transbordeur, Lyon (19/03/2017)
- 2015–2016 Participation to the drafting of the theatrical piece *Les π travaux d'Archimède*, played during Pi day 2016, at Théâtre National de la Criée in Marseille
- 2014–2016 Editor-in-chief of the mathematical section of *Trevolution*, the official newspaper of University of Roma Tre, Italy

Administrative Responsibilities

- 2017–2020 Appointed member of the council of the Mathematical Institute of Marseille (college of non-permanent researchers), Aix-Marseille University
- 2017–2018 Treasurer of **Pi Day association** for promotion and communication of Mathematics to the general public

Computer skills

- CAS Magma
- Programming C++
- OS Mac, Windows, Linux
- Documents \LaTeX , Word

Language skills

- Italiano (Mother tongue), Français (Near native), English (Excellent command), Español (Good command), Português (Basic command)
- 2018–2020 President of the **Café des Langues Luminy association** which organizes free daily sessions of languages exchange and teaching on the Campus of Aix–Marseille University in Luminy.