Giovanni Zini

Curriculum vitae

Name and surname: Giovanni Zini

Place and date of birth: Sassuolo (Modena), Italy, 18/08/1989

Nationality: Italian

Work address: University of Modena and Reggio Emilia, Department of Physics, Informatics and Mathematics, via G. Campi 213/b, 41125 Modena (MO), Italy

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Professional experience

January 2022 - present: Assistant Professor ("RTD-B") in Geometry at the University of Modena and Reggio Emilia, Department of Physics, Informatics and Mathematics.

July 2019 - December 2021: Research Fellow ("RTD-A") in Geometry at the University of Campania "Luigi Vanvitelli", Department of Mathematics and Physics.

November 2020: National Scientific Abilitation as Associate Professor in Algebra and Geometry.

January 2018 - July 2019: Postdoctoral Fellow at the University of Milano-Bicocca, Department of Mathematics and Applications.

April 2017 - December 2017: Teacher of Mathematics in a public school.

Education

June 2017: Ph.D. in Mathematics (cum laude), University of Firenze.
Advisor: Prof. Massimo Giulietti. Thesis: "Maximal curves over finite fields and related objects".

October 2013: M.Sc. Mathematics (cum laude), University of Modena and Reggio Emilia.
Advisor: Prof. Arrigo Bonisoli. Thesis: "Curve algebriche in caratteristica positiva e loro codici".

July 2011: B.S. Mathematics (cum laude), University of Modena and Reggio Emilia.
Advisor: Prof. Arrigo Bonisoli. Thesis: "Introduzione ai gruppi lineari proiettivi su campi finiti".

Research interests

Primary: Algebraic curves over finite fields

Secondary: Number Theory, Finite Geometry, Coding Theory, Cryptography

Research experiences

September 2023: Research visitor at ICMC, University of Sao Paulo in Sao Carlos (Brazil), invited by Prof. Herivelto Borges.

March 2023 - March 2024: Principal Investigator of the research project "Exceptional scattered linearized polynomials over finite fields", funded (1500 euros) by Italian mathematics institute GNSAGA-INdAM.

June 2021: Research visitor at University Paris 8 - LAGA in Paris (France), invited by Prof. Martino Borello.

December 2020 - August 2021: Tutor of Dr. Marco Timpanella for a postdoc position at the University of Campania "Luigi Vanvitelli".

September 2020 - December 2021: Principal Investigator of the research project "CodeCrypto" (efficient error-correcting codes for a secure post-quantum cryptography) of the University of Campania "Luigi Vanvitelli".

From 2018: Fellow of DeCrifis (national association of cryptography).

June 2017: Grant by Elsevier, for the conference "Fq13 - Finite Fields and Their Applications 2017".

From 2014: Fellow of the National Group for Algebraic and Geometric structures and their Applications (GNSAGA - INdAM).

2013 - 2017: Member of the project Prin 2012 "Strutture geometriche, combinatoria e loro applicazioni".

Publications

1. M. Timpanella, G. Zini: On a family of linear MRD codes with parameters $[8 \times 8, 16, 7]_q$, *Des. Codes Cryptogr.* **92** (2024), 507–530.
2. D. Bartoli, G. Zini, F. Zullo: Linear maximum rank distance codes of exceptional type, *IEEE Trans. Inform. Theory* **69** (6) (2023), 3627–3636.
3. M. Borello, W. Willems, G. Zini: On ideals in group algebras: An uncertainty principle and the Schur product, *Forum Math.* **34** (5) (2022), 1345–1354.
4. D. Bartoli, G. Zini, F. Zullo: Non-minimum tensor rank Gabidulin codes, *Linear Algebra Appl.* **650** (2022), 248–266.
5. D. Bartoli, M. Giulietti, G. Peraro and G. Zini: On monomial generalized almost perfect nonlinear functions, *Finite Fields Appl.* **82** (2022), art. 102050.
6. D. Bartoli, G. Micheli, G. Zini and F. Zullo: r-fat linearized polynomials over finite fields, *J. Combin. Theory Ser. A* **189** (2022), art. 105609.
7. D. Bartoli, G. Zini and F. Zullo: Investigating the exceptionality of scattered polynomials, *Finite Fields Appl.* **77** (2022), art. 101956.
8. G. Zini and F. Zullo: Scattered subspaces and related codes, *Des. Codes Cryptogr.* **89** (8) (2021), 1853-1873.
9. M. Borello, F. Dalla Volta and G. Zini: The Möbius function of $\mathrm{PSL}(3, 2^p)$ for any prime p, *Internat. J. Algebra Comput.* **31** (6) (2021), 987-1011.
10. F. Dalla Volta and G. Zini: On two Möbius functions for a finite non-solvable group, *Comm. Algebra* **49** (11) (2021), 4565-4576.
11. G. Zini: Coprime commutators in the Suzuki groups ${}^2B_2(q)$, *Bull. Austral. Math. Soc.* **104** (3) (2021), 448-452.
12. D. Bartoli, M. Montanucci and G. Zini: On certain self-orthogonal AG codes with applications to Quantum error-correcting codes, *Des. Codes Cryptogr.* **89** (6) (2021), 1221-1239.
13. G. Zini and F. Zullo: On the intersection problem for linear sets in the projective line, *Discrete Math.* **344** (6) (2021), art. 112359.
14. V. Napolitano, O. Polverino, G. Zini and F. Zullo: Linear sets from projection of Desarguesian spreads, *Finite Fields Appl.* **71** (2021), art. 101798.
15. M. Montanucci, D. Bartoli and G. Zini: Weierstrass semigroups at every point of the Suzuki curve, *Acta Arith.* **197** (1) (2021), 1-20.
16. O. Polverino, G. Zini and F. Zullo: On certain linearized polynomials with high degree and kernel of small dimension, *J. Pure Appl. Algebra* **225** (2) (2021), art. 106491, 16 pp.
17. M. Montanucci and G. Zini: The complete list of genera of quotients of the $\mathbb{F}_{q^2}$-maximal Hermitian curve for $q \equiv 1 \pmod 4$, *J. Algebra* **550** (2020), 23-53.
18. M. Montanucci and G. Zini: Quotients of the Hermitian curve from subgroups of $\mathrm{PGU}(3, q)$ without fixed points or triangles, *J. Algebraic Combin.* **52** (3) (2020), 339-368.
19. M. Bonini, M. Montanucci and G. Zini: On plane curves given by separated polynomials and their automorphisms, *Adv. Geom.* **20** (1) (2020), 61-70.
20. F. Dalla Volta, M. Montanucci and G. Zini: On the classification problem for the genera of quotients of the Hermitian curve, *Comm. Algebra* **47** (12) (2019), 4889-4909.
21. G. Zini: The Möbius function of $\mathrm{PSU}(3, 2^{2^n})$, *Ars Math. Contemp.* **16** (2) (2019), 377-401.
22. D. Bartoli, L. Quoos and G. Zini: Algebraic Geometric Codes on Many Points from Kummer Extensions, *Finite Fields Appl.* **52** (2018), 319-335.
23. M. Montanucci, M. Timpanella and G. Zini: AG codes and AG quantum codes from cyclic extensions of the Suzuki and Ree curves, *J. Geom.* **109** (1) (2018).
24. M. Montanucci and G. Zini: On the spectrum of genera of quotients of the Hermitian curve, *Comm. Algebra* **46** (11) (2018), 4739-4776.

25. M. Giulietti, M. Montanucci, L. Quoos and G. Zini: On some Galois covers of the Suzuki and Ree curves, *J. Number Theory* **189** (2018), 220-254.
26. D. Bartoli, M. Montanucci and G. Zini: Multi Point AG Codes on the GK Maximal Curve, *Des. Codes Cryptogr.* **86** (1) (2018), 161-177.
27. D. Bartoli and G. Zini: On permutation trinomials of type $x^{2p^s+r} + x^{p^s+r} + \lambda x^r$, *Finite Fields Appl.* **49** (2018), 126-131.
28. D. Bartoli, M. Montanucci and G. Zini: AG codes and AG quantum codes from the GGS curve, *Des. Codes Cryptogr.* **86** (10) (2018), 2315-2344.
29. M. Montanucci and G. Zini: Some Ree and Suzuki curves are not Galois covered by the Hermitian curve, *Finite Fields Appl.* **48** (2017), 175-195.
30. D. Bartoli, P. Speziali and G. Zini: Complete $(k, 4)$-arcs from quintic curves, *J. Geom.* **108** (3) (2017), 985-1011.
31. M. Montanucci and G. Zini: Generalized Artin-Mumford curves over finite fields. *J. Algebra* **485** (2017), 310-331.
32. D. Bartoli, M. Giulietti, L. Quoos and G. Zini: Complete permutation polynomials from exceptional polynomials. *J. Number Theory* **176** (2017), 46-66.
33. M. Giulietti, L. Quoos and G. Zini: Maximal curves from subcovers of the GK-curve, *J. Pure Appl. Algebra* **220** (10) (2016), 3372-3383.
34. M. Giulietti, M. Montanucci and G. Zini: On maximal curves that are not quotients of the Hermitian curve, *Finite Fields Appl.* **41** (2016), 72-88.
35. D. Bartoli, M. Giulietti and G. Zini: On monomial complete permutation polynomials, *Finite Fields Appl.* **41** (3) (2016), 132-158.
36. D. Bartoli, M. Giulietti and G. Zini: Complete $(k, 3)$-arcs from quartic curves, *Des. Codes Cryptogr.* **79** (3) (2016), 487-505.

Conferences and talks

June 2024: Selected talk: *Exceptional scattered polynomials in odd degree*, conference "WCC2024 - The Thirteenth International Conference on Coding and Cryptography" (Perugia, Italy).

June 2024: Talk: *A family of ordinary curves with many automorphisms*, conference "Combinatorics 2024" (Carovigno, Italy).

February 2024: Conference "OpeRa 2024 - Open Problems on Rank-Metric Codes" (Caserta, Italy).

September 2023: Invited talk: *Curves over finite fields and their automorphisms*, ICMC, University of Sao Paulo at Sao Carlos (Brazil).

July 2023: Invited talk: *Intertwined results in Finite Geometry and Coding Theory*, in the minisymposium "Coding Theory and Galois Geometries" in the conference "SIAM conference on Applied Algebraic Geometry - AG23" (Eindhoven, Netherlands).

July 2023: Talk: *Curve algebriche con molti automorfismi* (in italian), conference "Teoria dei Gruppi a Paestum, due giornate speciali" (Paestum, Italy).

June 2023: Talk: *On a family of scattered binomials over finite fields*, conference "Fq15 - finite fields and their applications" (Paris, France).

June 2023: Invited talk: *On some families of maximal curves*, Workshop "Algebraic curves over a finite field" (Perugia, Italy).

August-September 2022: Talk: *Subcovers of generalized GK curves and their automorphism groups*, conference by invitation "Finite Geometries 2022 - Sixth Irsee Conference" (Irsee, Germany).

May-June 2022: Conference "Combinatorics 2022" (Mantua, Italy).

May 2022: Invited talk: *Funzioni Generalized APN in caratteristica dispari e curve algebriche*, UMI-DeCifris Seminar (online).

September 2021: Talk: *On a class of linear square MRD codes*, first annual meeting of the UMI group "Teoria dei Codici e Crittografia" (online).

July 2021: Talk: *Moore polynomial sets over finite fields*, British Combinatorial Conference 2021 (online).

June 2021: Invited talk: *Some geometric aspects of linear MRD codes*, eSeminars "Discrete Mathematics, Codes and Cryptography eSeminars", University Paris 8 - LAGA.

March 2021: Online workshop: "Ischia Group Theory 2020/2021".

March 2021: Online workshop: "International Workshop on Cryptography and Coding Theory".

August 2020: Talk: *On the Möbius function of a finite group*, online conference "2020 Ural Workshop on Group Theory and Combinatorics".

July 2019: Invited talk: *Algebraic-Geometric codes from the Garcia-Güneri-Stichtenoth curve*, mini-symposium "Algebraic-Geometric codes" of the conference "SIAM Conference on Applied Algebraic Geometry" (Berna, Switzerland).

June 2019: Talk: *On Weierstrass semigroups and their applications in Coding Theory*, conference "SandGAL 2019 - Semigroups and Groups, Automata, Logics" (Cremona, Italy).

February 2019: Talk: *The Möbius function of some collineation groups of Galois planes*, conference "Finite Geometry 2019" (Szeged, Hungary).

September 2018: Workshop "GK70. A day of geometry in honour of Gabor Korchmáros" (Potenza, Italy).

September 2018: Workshop "La DeCifris incontra Milano" of the association DeCifris (Milano, Italy).

April 2018: Workshop on Finite Fields, Function Fields and Their Applications, in honour of Alev Topuzoglu and Henning Stichtenoth (Istanbul, Turkey).

June 2017: Talk: *Generalized Artin-Mumford curves and their automorphisms*, conference "Fq13 - Finite Fields and Their Applications" (Gaeta, Italy).

February 2017: Conference "RSA Conference 2017 on cybersecurity" (San Francisco, USA).

November 2016: Talk: *Complete permutation polynomials of monomial type*, workshop "BunnyTN7 2016 - settimo Convegno di Crittografia" (Trento, Italy).

August - September 2016: Talks: *On monomial complete permutation polynomials*, and *Maximal curves and Galois subcovers of the Hermitian curve*, conference "First Joint Meeting Italy-Brazil in Mathematics" (Rio de Janeiro, Brazil).

May - June 2016: Talk: *Maximal curves and quotients of the Hermitian curve*, conference "Combinatorics 2016" (Maratea, Italy).

September 2015: Talk: *Maximal curves which are not Galois subcovers of the Hermitian curve*, conference "Giornate di Geometria 2015" (Caserta, Italy).

July 2015: Talk: *Maximal curves from subcovers of the GK-curve*, conference "Fq12 - Finite Fields and Their Applications" (Saratoga Springs, USA).

June 2015: Talk: *New examples of maximal curves*, conference "MEGA 2015 - Effective methods in Algebraic Geometry" (Trento, Italy).

February 2015: Comunicazione: *New equations for maximal curves*, workshop "Algebraic Curves and Function Fields over a finite field" (Perugia, Italy).

June 2014: Conference "Combinatorics 2014" (Gaeta, Italy).

June 2013: Workshop "New trends in Algebraic Geometry" (Rende, Italy).

Organization activity

May-June 2022: Member of the conference committee of "Combinatorics 2022" (Mantua, Italy).

From 2021: Co-organizer of the series "Young Seminars" of the group "Galois geometries and their applications" at the University of Campania (https://sites.google.com/view/galoisgeometriesapplications/young-seminars).

From 2020: Co-organizer of the series of seminars of the group "Galois geometries and their applications" at the University of Campania (https://sites.google.com/view/galoisgeometriesapplications/seminars).

Referee activity

Since 2014: Referee for Mathematical Reviews (MathSciNet) e for several international journals, among others: Advances in Geometry; Advances in Mathematics of Communications; Applicable Algebra in Engineering, Communication and Computing; Ars Combinatoria; Designs, Codes and Cryptography; Discrete Applied Mathematics; Discrete Mathematics; Examples and Counterexamples; Finite Fields and Their Applications; IEEE Transactions on Information Theory; Journal of Combinatorial Theory Series A; Journal of Pure and Applied Algebra; Lecture Notes in Computer Science; Open Mathematics.

June 2022: Member of the examining committee for the Ph.D. thesis defense of Stefano Lia and Giusy Monzillo (Ph.D. in Mathematics, Universities of Basilicata and Salento).

January 2022: Reviewer of the Ph.D. thesis of Vincenzo Pallozzi Lavorante (Ph.D. in Mathematics, Universities of Parma, Modena and Ferrara).

Teaching activity at University of Modena and Reggio Emilia

a.a. 2023/2024: Algebra B (3 CFU, degree in Mathematics).
Linear Algebra (9 CFU, degree in Computer Science).

a.y. 2022/2023: Geometry (6 CFU, degree in Physics).
Linear Algebra (9 CFU, degree in Computer Science).

a.y. 2021/2022: Algebra and Geometry (6 CFU, degree in Computer Engineering).

Teaching activity in other universities:

a.y. 2020/2021: Linear Algebra and Analytic Geometry (degree in Engineering, University of Campania).
Finite Geometry and Applications (master degree in Mathematics, University of Campania).
Algebraic curves over finite fields and related codes (Ph.D. course, University of Campania).

a.y. 2019/2020: Linear Algebra and Analytic Geometry (degree in Engineering, University of Campania).
Algebraic Geometry (master degree in Mathematics, University of Campania).
Algebraic curves and applications in cryptography (Ph.D. course, University of Campania).

a.y. 2018/2019: Algebra (degree in Mathematics, University of Verona).
Geometry (degree in Engineering, University of San Marino).
Exercises of Linear Algebra (degree in Mathematics, University of Milano-Bicocca).

a.y. 2017/2018: Algebra (degree in Mathematics, University of Verona).
Exercises of Linear Algebra (degree in Mechatronics Engineering, University of Modena and Reggio Emilia).

From 2012 to 2017: Exercises for courses of Algebra, Geometry, Analysis, Statistics at the University of Modena and Reggio Emilia and at the University of Perugia.

Student supervision

September 2023: Gabriele Taurasi, "An introduction to Algebraic Curves over Finite Fields and Related Codes" (bachelor degree).

March 2021: Massimo Leardi, "Curve algebriche su campi finiti e aplicazioni a una famiglia di polinomi di permutazione" (master degree).

March 2019: Katia Hochstetter, "Algebraic-Geometric Codes from the Dickson-Guralnick-Zieve curve over a finite field" (master degree).

Popularization

June 2024: Lesson "Che combinazione, una geometria!" for highschool students (school "A tu per tu con la scienza", University of Modena and Reggio Emilia).

May 2024: Stand "Gioca con la geometria!" in the international exhibition of game "PLAY" (Modena).

February 2024: Lesson "Qualche punto e qualche retta: che combinazione, una geometria!" for highschool students (school "La matematica è il mio mestiere?", University of Modena and Reggio Emilia).

April 2023: Seminar "Contare e ricontare: come combinare alcune tecniche di conteggio" in the festival "XIII Festa di Scienza e Filosofia" (Foligno, Italy).

June 2022: Lesson "Errori di comunicazione e come correggerli: la matematica dei codici" in the summer school "Una settimana da scienziato" for high-school students (University of Modena and Reggio Emilia).

April 2022: Seminar "Errori di comunicazione e come correggerli: la matematica dei codici" in the festival "XI Festa di Scienza e Filosofia" (Foligno, Italy).

10/07/2024

Giovanni Zini