Sandro Mattarei

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EDUCATION

July 1992	PhD in Mathematics, University of Warwick (Supervisor: T.O. Hawkes)
Sept. 1988	Laurea in Matematica, University of Trento, Italy

EMPLOYMENT

Oct. 2023–	Associate Professor, University of Milano-Bicocca
Sep. 2016–Sep. 2023	Senior Lecturer, University of Lincoln
Sep. 2015–Aug. 2016	Lecturer, University of Lincoln
Sep. 2006–Aug. 2007	Lecturer (fixed-term), University of Nottingham
Nov. 1998–Aug. 2015	Associate Professor, University of Trento
July 1994–Oct. 1998	Assistant Professor, University of Padova
Sept. 1992–June 1994	Secondary school teacher of Mathematics, Cles (Trento)

PROFESSIONAL QUALIFICATIONS

Nov. 2016–	Member of the EPSRC Peer Review College
Nov. 2015	Associate Fellow of the Higher Education Academy
June 2013	Awarded the Italian *Abilitazione Scientifica Nazionale a professore di I fascia* (Italian academic accreditation to full professor)

PHD STUDENTS

Valentina Iusa	*Fixed point-free groups of automorphisms,* University of Lincoln, May 2019.
Claudio Scarbolo	*Graded Lie algebras of maximal class in characteristic p, generated by two elements of degree one and p,* University of Trento, Mar. 2014
Marco Pizzato	*Some problems concerning polynomials over finite fields,* University of Trento, Dec. 2013
Simone Ugolini	(supervised jointly with A. Caranti) *Graded Lie algebras of maximal class in positive characteristic, generated by two elements of different weights,* University of Trento, Apr. 2010

VARIOUS PROFESSIONAL ACTIVITIES

Conference organisation.

Sept. 2022   Co-organiser of a one-day conference *Topics in Algebra* (on the occasion of the 70th birthday of A. Caranti and C.M. Scoppola), Trento

June 2021   Co-organiser of a *London Mathematical Society Midlands Regional Meeting* at the University of Lincoln, followed by a two-day workshop on *Profinite Groups and Related Aspects.*

Sept. 2016   Organiser of a three-day international conference at the University of Lincoln, *Groups, rings, and their automorphisms* (60th birthday of Evgeny Khukhro).

May 2013   Organiser of a two-day workshop on *Lie algebras and finite fields,* in Trento.

June 2002   Organiser of a one-week graduate summer school, taking place in Trento, on *Zeta-functions in group theory,* taught by Marcus du Sautoy and myself.

Refereeing and reviewing.

Referee of over fifty papers for the following journals:

J. London Math. Soc., Israel J. Math., J. Algebra, Finite Fields Appl., J. Number Theory, Linear Algebra Appl., Proc. Edinb. Math. Soc., Acta Arithm., Internat. J. Algebra Comput., J. Aust. Math. Soc., Des. Codes Cryptography, Comm. Algebra, Internat. J. Group Theory, Rocky Mountain J. Math., Publ. Math. Debrecen, La Matematica, Rend. Sem. Mat. Univ. Padova, Riv. Mat. Univ. Parma, Math. Slovaca, Bull. Malays. Math. Sci. Soc., Boll. Unione Mat. Ital.

Former reviewer for Zentralblatt MATH.

Invited book review for Nieuw Archief voor Wiskunde (T. Peterfalvi, *Character theory for the Odd Order Theorem,* CUP, 2000).

Academic services.

From January 2019 Programme Leader for the MMath programme at University of Lincoln.

From 2010 to 2015 on the examiner board for admission to *Collegio di Merito Bernardo Clesio,* Trento.

Faculty coordinator from March 2002 to September 2004 for language learning.

Faculty coordinator for *Rapporti Internazionali* from March 2001 to February 2002 (international cooperation, students and teaching staff mobility, double degrees), University of Trento.

Starting in June 1999, in charge of establishing a Double Degree programme in Mathematics between the Universities of Trento and Tübingen (Germany), finalized in July 2003.

Outreach.
From 2016 to 2023, outreach coordinator for the School of Mathematics and Physics, University of Lincoln.

In 2006 I took part in an outreach program in secondary schools near Trento, on the topic *Algebra and cryptography.*

Professional bodies.

Member of the London Mathematical Society.

PUBLICATIONS

Articles published or in press

52. (with M. Pizzato) *Cubic rational expressions over a finite field*, J. Algebra Appl., in press, DOI: 10.1142/S0219498825503190.

51. (with R. Tauraso) *Congruences for partial sums of the generating series for* $\binom{3k}{k}$ Int. J. Number Theory **21**, 237-256 (2025).

50. (with M. Avitabile) *The Artin-Hasse series and Laguerre polynomials modulo a prime*, Aequationes Math. **98**, 1409-1417 (2024).

49. (with M. Avitabile) *On some coefficients of the Artin-Hasse series modulo a prime*, Indag. Math., New Ser. **35**, 317-328 (2024).

48. (with M. Avitabile) *Diamond distances in Nottingham algebras*, J. Algebra Appl. **22**, Article ID 2350032, 22p. (2023).

47. (with M. Pizzato) *Irreducible polynomials from a cubic transformation*, Finite Fields Appl. **84**, Article ID 102111, 22p. (2022).

46. (with M. Avitabile) *The earliest diamond of finite type in Nottingham algebras*, J. Lie Theory **32** (2022), 771–796.

45. *Constituents of graded Lie algebras of maximal class and chains of thin Lie algebras*, Commun. Algebra **50** (2022), 726–739.

44. *A sandwich in thin Lie algebras*, Proc. Edinb, Math. Soc., II Ser. **65** (2022), 136–145.

43. (with S. Ugolini) *Graded Lie algebras of maximal class of type n*, J. Algebra **593** (2022), 142–177.

42. (with V. Iusa and C. Scarbolo) *Graded Lie algebras of maximal class of type p*, J. Algebra **588** (2021), 77–117.

41. (with M. Avitabile) *Generalized finite polylogarithms*, Glasg. Math. J. **63** (2021), 66–80.

40. (with M. Avitabile) *A generalized truncated logarithm*, Aequationes Math. **93** (2019), 711–734.

39. (with R. Tauraso) *From generating series to polynomial congruences*, J. Number Theory **182** (2018), 179–205.

38. (with M. Pizzato) *Generalizations of self-reciprocal polynomials*, Finite Fields Appl. **48** (2017), 271–288.

37. (with M. Avitabile) *Grading switching for modular non-associative algebras*, Proceedings of the Bicocca-Workshop on Lie Algebras 2013, 1–14, Contemp. Math., **652**, Amer. Math. Soc., Providence, RI, 2015.

36. *Inversion and subspaces of a finite field*, Israel J. Math. **206** (2015), 327–351.

35. (with M. Avitabile) *Laguerre polynomials of derivations*, Israel J. Math. **205** (2015), 109–126.

34. (with M. Avitabile) *Nottingham Lie algebras with diamonds of finite and infinite type*, J. Lie Theory **24** (2014), 457–473.

33. *A property of the inverse of a subspace of a finite field*, Finite Fields Appl. **29** (2014), 268–274.

32. (with R. Tauraso) *Congruences for central binomial sums and finite polylogarithms*, J. Number Theory **133** (2013), 131–157.

31. *Engel conditions and symmetric tensors*, Linear Multilinear Algebra **59** (2011), no. 4, 441–449.

30. (with M. Avitabile and G. Jurman) *The structure of thin Lie algebras with characteristic two*, Internat. J. Algebra Comput. **20** (2010), 731–768.

29. (with R. Tauraso) *Congruences of multiple sums involving sequences invariant under the binomial transform*, J. Integer Seq. **13** (2010), no. 5, Article 10.5.1, 12 pp.

28. (with M. Avitabile) *Diamonds of finite type in thin Lie algebras*, J. Lie Theory **19** (2009), 185–207. (Inadvertently published for a second time as J. Lie Theory **19** (2009), 483–505.)

27. *A sufficient condition for a number to be be the order of a nonsingular derivation of a Lie algebra*, Israel J. Math. **171** (2009), 1–14.

26. *Linear recurrence relations for binomial coefficients modulo a prime*, J. Number Theory **128** (2008), no. 1, 49–58.

25. (with M. Avitabile) *Thin loop algebras of Albert-Zassenhaus algebras*, J. Algebra **315** (2007), no. 2, 824–851.

24. *Root multiplicities and number of nonzero coefficients of a polynomial*, J. Algebra Appl. **6** (3) (2007), 469-475.

23. *On a bound of Garcia and Voloch for the number of points of a Fermat curve over a prime field*, Finite Fields Appl. **13** (2007), no. 4, 773–777.

22. *Inverse-closed additive subgroups of fields*, Israel J. Math. **159** (2007), 343–348.

21. *A note on automorphisms of free nilpotent groups*, Boll. Unione Mat. Ital. Sez. B Artic. Ric. Mat. (8), **10** (2007), 441-444.

20. *The orders of nonsingular derivations of Lie algebras of characteristic two*, Israel J. Math. **160** (2007), 23–40.

19. (with A. Caranti) *Automorphisms of p-groups of maximal class*, Rend. Sem. Mat. Univ. Padova **115** (2006), 189–198.

18. *Exponential functions in prime characteristic*, Aequationes Math. **71** (2006), no. 3, 311–317.

17. *Retrieving information about a group from its character degrees or from its class sizes*, Proc. Amer. Math. Soc. **134** (2006), 2189–2195.

16. *Modular periodicity of binomial coefficients*, J. Number Theory **117** (2006), no. 2, 471–481.

15. *On a special congruence of Carlitz*, Integers **6** (2006), A09, 13 pp. (electronic).

14. (with A. Caranti) *Gradings of non-graded Hamiltonian algebras*, J. Aust. Math. Soc. **79** (2005), no. 3, 399–440.

13. *Artin-Hasse exponentials of derivations*, J. Algebra **294** (2005), no. 1, 1–18.

12. (with M. Avitabile) *Thin Lie algebras with diamonds of finite and infinite type*, J. Algebra **293** (2005), no. 1, 36–64.

11. (with A. Caranti) *Nottingham Lie algebras with diamonds of finite type*, Internat. J. Algebra Comput. **14** (2004), 35–67.

10. *The orders of nonsingular derivations of modular Lie algebras*, Israel J. Math. **132** (2002), 265–275.

9. (with K. W. Johnson and S. K. Sehgal) *Weak Cayley tables*, J. London Math. Soc. **61** (2000), 395–411.

8. (with A. Caranti) *Some thin Lie algebras related to Albert-Frank algebras and algebras of maximal class*, J. Austr. Math. Soc. Ser. A **67** (1999), 157–184.

7. *Some thin pro-p-groups*, J. Algebra **220** (1999), no. 1, 56–72.

6. (with A. Caranti, and M. F. Newman) *Graded Lie algebras of maximal class*, Trans. Amer. Math. Soc. **349** (1997), no. 10, 4021–4051.

5. (with A. Caranti, M. F. Newman, and C. M. Scoppola) *Thin groups of prime-power order and thin Lie algebras*, Quart. J. Math. Oxford Ser. (2) **47** (1996), no. 187, 279–296.

4. *On character tables of wreath products*, J. Algebra **175** (1995), no. 1, 157–178.

3. *An example of p-groups with identical character tables and different derived lengths*, Arch. Math. (Basel) **62** (1994), no. 1, 12–20.

2. (with A. Caranti and N. Gavioli) *Subgroups of finite p-groups inducing the same permutation character*, Comm. Algebra **22** (1994), no. 3, 877–895.
1. *Character tables and metabelian groups*, J. London Math. Soc. (2) **46** (1992), no. 1, 92–100.

<div align="center">PHD THESIS</div>

1. *Retrieving information about a group from its character table*, Ph.D. thesis, Warwick, 1992.

RESEARCH INTERESTS

Group theory (finite and profinite groups, their representation theory).
Lie algebras (especially in prime characteristic).
Finite fields (polynomials and equations over finite fields, special subsets of finite fields).
Number theory (congruences modulo primes or prime powers, finite polylogarithms).

FUNDING

Apr. 2010–Mar. 2012	Grant from MIUR-Italy for the project *Lie algebras, groups, computational methods, combinatorial identities, derivations*, € 42000, together with A. Caranti (PI), W. A. de Graaf, C. M. Scoppola, N. Gavioli.
Feb. 2007–Jan. 2009	Grant from MIUR-Italy for the project *Lie rings and algebras, groups, cryptography*, € 34000, together with A. Caranti (PI), C. M. Scoppola, N. Gavioli.
Dec. 2003–Nov. 2005	Grant from MIUR-Italy for the project *Graded Lie algebras and pro-p groups: representations, periodicity and derivations*, € 38500, together with A. Caranti (PI), C. M. Scoppola, N. Gavioli, V. Monti
Dec. 2001–Nov. 2003	Grant from MURST-Italy for the project *Graded Lie algebras and pro-p groups of finite width, loop algebras and derivations*, € 56000, together with A. Caranti (PI), C. M. Scoppola, N. Gavioli, V. Monti.
Dec. 1999–Nov. 2001	Grant from MURST-Italy for the project *Graded Lie algebras and pro-p groups of finite width*, € 36668, together with A. Caranti (PI), C. M. Scoppola, N. Gavioli, V. Monti.
Sept. 1992	Twelve-month post-doctoral grant from *Istituto Nazionale di Alta Matematica Francesco Severi,* Italy, € 8000 (declined).
Oct. 1989–July 1992	Grant from CNR-Italy, *Borsa di studio per l'estero per laureati* (in support of PhD study at the University of Warwick), € 40000.
Sept. 1987–Aug. 1988	Award from CNR–Italy, *Borsa di studio per laureandi*, € 1800.

INVITED ADDRESSES

Mar. 1993	Seminar talk, University of Trento, Italy
May 1993	Seminar talk, University of Padova, Italy
June 1997	Seminar talk, University of Florence, Italy
July 1997	LMS Symposium on Pro-p-groups and Related Topics, Durham
Nov. 1997	Seminar talk, University of Warwick
Sept. 1998	Seminar talk, University of L'Aquila, Italy
Sept. 1998	Seminar talk, University of Lausanne, Switzerland
Nov. 1998	Seminar talk, New Mexico State University, Las Cruces (NM), USA
Apr. 2004	Group Theory 2004 Ischia (Napoli), Italy
May 2004	Seminar talk, University of Regensburg, Germany
May 2004	Conference on Lie Algebras, their Classification and Applications, Braunschweig, Germany
July 2004	Colloquium talk, University of Regensburg, Germany
Nov. 2004	Seminar talk, University of Nottingham
Feb. 2005	Seminar talk, University of Warwick
July 2005	Colloquium talk, Fernuniversität Hagen, Germany
Nov. 2006	Seminar talk, University of Nottingham
June 2007	Seminar talk, University of Manchester
June 2007	Seminar talk, University College, Dublin
Aug. 2007	Colloquium talk, University of Sheffield
Sept. 2007	Seminar talk, University College, Dublin
Nov. 2007	Workshop on Lie algebras and applications, University of Milano-Bicocca
July 2008	South England Profinite Groups Meeting, Cambridge
Oct. 2008	Workshop on Lie algebras and Jordan systems, Madrid
May 2009	Topics in Algebra (70th birthday of A. E. Zalesskii), Milan
May 2011	Bicocca-Workshop on Lie Algebras 2011, Milan
Oct. 2011	Workshop on Jordan systems, Lie algebras, and their connections, Madrid
Aug. 2012	Seminar talk, University of Oviedo, Spain
May 2013	Bicocca-Workshop on Lie Algebras 2013 (70th birthday of H. Strade), Milan
Aug. 2013	Seminar talk, University College, Dublin
Feb. 2016	Seminar talk, University of Bath
Mar. 2016	Seminar talk, Royal Holloway, University of London
Apr. 2016	Seminar talk, University of Udine (Italy)
Apr. 2016	Seminar talk, University of Milano Bicocca
Apr. 2016	Seminar talk, University of Verona
May 2016	Seminar talk, University College, Dublin
Apr. 2017	Seminar talk, University of Milano Bicocca
May 2017	Seminar talk, University of Cambridge
Oct. 2017	Topics on Groups and Their Representations (70th birthday of L. di Martino), Gargnano sul Garda (Italy)
July 2018	Workshop on Non-associative algebras and Applications, Lancaster
Nov. 2018	Seminar talk, University of Loughborough
Apr. 2019	Algebra session speaker, British Mathematical Colloquium, Lancaster
Sept. 2020	Workshop on Linear groups, Lincoln
Nov. 2021	Speaker in GOThIC – Ischia Online Group Theory Conference
Nov. 2021	Seminar talk (online), University of Milano Bicocca
May 2022	Seminar talk, University of Bath
Sept. 2022	Topics in Algebra (70th birthday of A. Caranti and C.M. Scoppola), Trento
June 2023	European Non-Associative Algebra Seminar (online)
June 2024	Conference "10 Years of Algebra at Lincoln", Lincoln

ACADEMIC VISITS

March and May 2022	(two 1-week periods) University of Bath
Apr. 2017	(4 weeks) University of Milano-Bicocca (Visiting Professor)
Oct. 2004–Aug. 2005	University of Nottingham
May–July 2004	(10 weeks) University of Regensburg, Germany
Nov. 1997	(4 weeks) University of Warwick
Oct. 1989–Sept. 1992	PhD student at the University of Warwick
Nov. 1987	(4 weeks) University of Aachen, Germany

TEACHING EXPERIENCE

At University of Padova (in Italian)**:** *Geometry and Linear Algebra* (problem sessions for Engineering students, 1995, 1996, 1997, 1998); *Higher Algebra* (1998); *Topics in Representation Theory* (graduate course, 1998).

At University of Regensburg (in English)**:** *Lie Algebras* (graduate course, 2004, Socrates-Erasmus teaching staff mobility program).

At University of Nottingham (in English)**:** *Group Theory* (2007); *Foundation Mathematics* (for Chemistry students, 2007).

At University of Trento. Undergraduate courses (in Italian)**:** *Algebra* (five times since 1999); *Higher Algebra* (1999, 2000); *Galois Theory* (2002); *Group Theory* (eight times since 2008).

   Graduate courses (in English)**:** *Representation Theory of Finite Groups* (2002); *Number Theory and Cryptography* (nine times since 2002); *Discrete Fourier Analysis* (four times since 2006); *Finite Fields and Symmetric Cryptography* (2010, 2012, 2014); *Algebraic Number Theory* (2013, 2014, 2015)

   Service teaching (in Italian)**:** *Discrete Mathematics* (for Computer Science students, 2003, 2006); *Linear Algebra and Geometry* (for Engineering students, 2010, 2014, 2015).

At University of Lincoln (in English)**:** *Algebra* (2015–2022); *Coding Theory* (2016, 2017); *Lie Algebras* (graduate course, 2018–2022). *Advanced Topics of Mathematics and Mathematics Seminar* (2017–2022).

Most courses involved about 40 teaching hours in class, office hours, handing out weekly problem sets, carrying out written and oral examinations. Undergraduate courses had between thirty and seventy participants, graduate courses between five and twenty, and service courses over two hundred. For most of the courses I developed my own teaching material.

Between 2001 and 2015 I supervised about twenty Master's theses (tesi di Laurea) at Trento, and acted as an examiner for about as many. Since 2016 I have supervised a handful of Master's theses at Lincoln.

Updated on February 17, 2025