

# CURRICULUM VITAE

## Sandro Bettin

**Current position:** Ricercatore di tipo B at the University of Genova

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**Nationality:** Italian

### EDUCATION

- Ph.D. in Mathematics  
*University of Bristol, UK, October 2009 - July 2012 (Thesis Defense: Bristol, July 25, 2012)*  
*Dissertation: Moments, Period Functions and Cotangent Sums*  
*Advisors: Brian Conrey and Nina Snaith*
- Visitor student  
*University of Bristol, UK, October 2008 – September 2009*
- Laurea Specialistica  
*Università degli Studi di Padova, Italy, October 2006 – July 2008*  
*Final grade: 110/110 cum laude*
- Laurea Triennale  
*Università degli Studi di Padova, Italy, October 2003 – September 2006*  
*Final grade: 110/110 cum laude*

### EMPLOYMENT

- Researcher B:  
*Dipartimento di Matematica, University of Genova, Italy, 2018 -*
- Researcher A:  
*Dipartimento di Matematica, University of Genova, Italy, 2015 - 2018*
- Postdoctoral fellow:  
*ICERM, Brown University, USA, 2015*  
*Centre de Recherches Mathématiques (CRM), Université de Montréal, Canada, 2012 - 2015*
- Research Assistant Professor:  
*Concordia University, Canada, January 2013 – May 2013, January 2014 – May 2014, January 2015 – May 2015*

### RESEARCH INTERESTS

L-functions, Average of arithmetic functions, Random Matrix Theory, Continued fractions, Kloosterman sums, Authomorphic Forms, and Analytic Number Theory in general.

### PUBLICATIONS

*Published*

1. S. Bettin – *The second moment of the Riemann zeta function with unbounded shifts*. Int. J. Number Theory 6 (2010), no. 8, 1933–1944 (<http://arxiv.org/abs/1111.0925>).
2. S. Bettin, B. Conrey – *A reciprocity formula for a cotangent sum*. International Mathematics Research Notices, 2013, no. 24, 5709–5726.
3. S. Bettin, B. Conrey – *Period functions and cotangent sums*. Algebra & Number Theory 7 (2013), no. 1, 215–242. (<http://arxiv.org/abs/1111.0931>).
4. S. Bettin, B. Conrey, D. Farmer – *An optimal choice of Dirichlet polynomials for the Nyman-Beurling criterion*. A.A. Karatsuba issue in the Proceedings of the Steklov Institute of Mathematics. April 2013, Volume 280, Issue 2 Supplement, pp 30-36 (<http://arxiv.org/abs/1211.5191>).
5. S. Bettin – *A generalization of Rademacher's reciprocity formula*. Acta Arith. 159 (2013), 363-374.
6. S. Bettin, B. Conrey – *The second weighted moment of zeta*. Actes de la conférence “Théorie des nombres et applications”, CIRM, Luminy, 16-20 janvier 2012, Publications Mathématiques de Besançon - Algèbre et Théorie des Nombres (2013), 41-47.
7. S.A. Altug, S. Bettin, I. Petrow, Rishikesh, I. Whitehead – *A Recursion Formula for*

- Moments of Derivatives of Random Matrix Polynomials*. Quarterly Journal of Mathematics (2014) 65 (4): 1111-1125.. (<http://arxiv.org/abs/1212.1389>).
8. S. Bettin, V. Chandee, M. Radziwill – *The mean square of the product of the Riemann zeta function with Dirichlet polynomials*. Journal für die reine und angewandte Mathematik (Crelle) 729 (Aug 2017), 51-79 (<http://arxiv.org/abs/1411.7764>).
  9. S. Bettin – *On the distribution of a cotangent sum*. Int Math Res Notices (2015) 2015 (21): 11419-11432. (<http://arxiv.org/abs/1411.2293>).
  10. S. Bettin – *On the reciprocity law for the twisted second moment of Dirichlet L-functions*. Trans. Amer. Math. Soc. 368 (2016), 6887-6914. (<https://arxiv.org/abs/1607.05595>).
  11. S. Bettin, S. Gonek – *The  $\theta=\infty$  conjecture implies the Riemann hypothesis*. Mathematika, volume 63 (2017), issue 01, pp. 29-33. (<https://arxiv.org/abs/1604.02740>).
  12. S. Bettin – *The first moment of twisted Hecke L-functions with unbounded shifts*. Funct. Approx. Comment. Math. Volume 57, Number 1 (2017), 105-114 (<https://arxiv.org/abs/1605.02440>).
  13. S. Bettin – *A congruence sum*. Rend. Circ. Mat. Palermo, II. Ser., 66(3), 477-483 (<https://arxiv.org/abs/1701.06614>).
  14. S. Bettin, B. Martin – *On the non-vanishing of certain Dirichlet series*. Journal of Number Theory 180 (Nov 2017), 423-442. (<https://arxiv.org/abs/1704.08358>).
  15. S. Bettin, J.W. Bober, A.R. Booker, B. Conrey, M. Lee, G. Molteni, T. Oliver, D.J. Platt, R.S. Steiner – *A conjectural extension of Hecke's converse theorem*. The Ramanujan Journal, 2018, Volume 47, Issue 3, pp 659–684. (<https://arxiv.org/abs/1704.02570>).
  16. S. Bettin, V. Chandee – *Trilinear forms in Kloosterman fractions*. Advances in Mathematics, vol. 328, p. 1234-1262. (<http://arxiv.org/abs/1502.00769>).
  17. S. Bettin, S. Drappeau, L. Spiegelhofer – *Statistical distribution of the Stern sequence*. Comment. Math. Helv. 94 (2019), no. 2, 241–271. (<https://arxiv.org/abs/1704.05253>).
  18. S. Bettin – *High moments of the Estermann function*. Algebra & Number Theory, Vol. 13 (2019), No. 2, 251–300. (<https://arxiv.org/abs/1701.06601>).
  19. S. Bettin – *Linear correlations of the divisor function*. Acta Arithmetica 188 (2019) , 1-52. (<https://arxiv.org/abs/1701.06608>).
  20. S. Bettin, C. David, C. Delaunay – *Non-isotrivial elliptic surfaces with non-zero average root number*. Journal Number Theory, Volume 191, October 2018, Pages 1-84. (<https://arxiv.org/abs/1612.03095>).
  21. S. Bettin, G. Molteni, C. Sanna – *Small values of signed harmonic sums*. C. R. Acad. Sci. Paris, Ser. I., 2018. Volume 356, Issues 11–12, 1062-1074. (<https://arxiv.org/abs/1806.05402>).
  22. S. Bettin, K. Destagnol – *The power-saving Manin-Peyre's conjectures for a senary cubic*. Mathematika, volume 65 (2019), issue 04, pp. 789-830. (<https://arxiv.org/abs/1805.02756>).
  23. S. Bettin, C. Perret-Gentil and M. Radziwill – *A note on the dimension of the largest Hecke-submodule*. To appear in Int. Math. Res. Not. IMRN. DOI:10.1093/imrn/rny287. (<https://arxiv.org/abs/1810.02006>)
  24. E. C. Bailey, S. Bettin, G. Blower, J.B. Conrey, A. Prokhorov, M.O. Rubinstein, N.C. Snaith – *Mixed moments of characteristic polynomials of random unitary matrices*. Journal of Mathematical Physics. Journal of Mathematical Physics 60, 083509 (2019). (<https://arxiv.org/abs/1901.07479>).
  25. S. Bettin, S. Drappeau – *Partial sums of the cotangent function*. To appear in Journal de Théorie des Nombres de Bordeaux. (<https://arxiv.org/abs/1905.01954>).
  26. S. Bettin, G. Molteni, C. Sanna – *Greedy approximations by signed harmonic sums and the Thue-Morse sequence*. Advances in Mathematics, Volume 366, 3 June 2020, 107068. (<https://arxiv.org/abs/1805.00075>).
  27. S. Bettin, S. Drappeau – *Two arithmetic applications of perturbations of composition operators*. To appear in Journal d'Analyse Mathématique.

Submitted

28. S. Bettin, H.M. Bui, X. Li, M. Radziwill – *A quadratic divisor problem and moments of the Riemann zeta-function*. (<https://arxiv.org/abs/1609.02539>).

29. S. Bettin, S. Drappeau – Limit laws for rational continued fractions and value distribution of quantum modular forms. (<https://arxiv.org/abs/1903.00457>).
30. S. Bettin, S. Drappeau – Modularity and value distribution of quantum invariants of hyperbolic knots. (<https://arxiv.org/abs/1905.02045>).
31. S. Bettin, B. Conrey – *Averages of long Dirichlet polynomials*. (<https://arxiv.org/abs/2002.09466>)

## HONORS, AWARDS AND GRANTS

- Guido Fubini Prize 2019 (€ 10000)
- “Abilitazione Scientifica Nazionale, settore 01/A2” (from 18/09/2018 to 18/09/2024)
- “Abilitazione Scientifica Nazionale, settore 01/A3” (from 27/07/2018 to 27/07/2024)
- Winner of the INDAM national grant “Bando di concorso per il finanziamento di n. 6 progetti di ricerca per giovani ricercatori” (2018), awarding € 35 000, used to hire a postdoctoral fellow (Carlo Sanna) and for research expenses.
- Member of the PRIN 2017, 2017JTLHJR\_004, “Geometric, algebraic and analytic methods in arithmetic”.
- Member of the PRIN 2015, 2015XBNXYC\_002, “Number Theory and Arithmetic Geometry”.
- Member of several projects funded by the “Fondi di ricerca di Ateneo” (University of Genova).
- Winner of the INDAM grant “Concorso a n. 21 mensilità di borse di studio per l'estero 2017-2018, awarding € 4000.
- Winner of the national grant “Fondo di Finanziamento per le Attività Base di Ricerca 2017”, awarding € 3 000.
- Winner of two grants (by the University of Genova) of € 2 500 (2017) and of € 1 900 (2018) to fund international research visits.
- ICERM Semester Postdoctoral Fellowship, Fall 2015.
- CICMA Postdoctoral Fellowship, Centre de Recherches Mathématiques, Université de Montréal, 2012-15.
- Faculty of Science commendation for the PhD thesis, University of Bristol.
- UoB Centenary Home/Eu Postgraduate Research Scholarship and Excellence Award, University of Bristol 2009-12. (£ 6 000 in total)
- Scholarship from the “Fondazione Ing. Aldo Gini” 2008-09 (€ 6 800)
- INDAM scholarship for students attending the Laurea Specialistica in Mathematics. (€ 12 000 in total)
- INDAM scholarship for students attending the Laurea Triennale in Mathematics. (€ 12 000 in total)

## POSTDOCTORAL STUDENTS

- Giacomo Cherubini (co-supervised with Alberto Perelli), Università di Genova, 2017-18
- Carlo Sanna, Università di Genova, 2018-19
- Luca Ghidelli, Università di Genova, 2020

## PHD STUDENTS

- Giamila Zaghoul (joint with Alberto Perelli from Università di Genova), Università di Genova 2015-18
- Remis Tonon (joint with Alessandro Zaccagnini from University of Parma), Università di Parma 2016-20
- Alessandro Fazzari (joint with Jon Keating from University of Bristol), Università di Genova 2017-??

## MASTER STUDENTS AND INTERNSHIPS

- Master thesis supervisor of
  - Mojgen Hosseinzadeh Dehaj (Master student at ETH Zurich), October 2019-March 2020
- Internship (“stage”) supervisor of:
  - Agathe Beaugrand (Master student at École Normale Supérieure de Lyon), May-July 2019
  - Pierre Tchamitchian (Master student at École Normale Supérieure de Rennes), June-July 2019

## TALKS

- Invited talk at the conference “Number Theory and Physics”, Natal (Brazil) – 2020 (upcoming, postponed)
- Invited talk at the Fubini Prize award ceremony, Torino – 2020 (upcoming, postponed)
- Invited talk at the “Exeter Number Theory seminar”, Exeter – 2020 (upcoming, postponed)
- Invited talk at the “London Number Theory seminar”, UCL, London – 2020
- Invited talk at the “Séminaire de théorie des nombre”, Institut Fourier, Grenoble – 2020
- Invited talk at the number theory session of the “XXI Congresso dell’Unione Matematica Italiana”, Pavia – 2019
- Invited talk at the “The fifth mini symposium of the Roman number theory association”, Università di Roma Tre – 2019
- Invited talk at the “ETH Number theory seminar”, ETH Zürich – 2019
- Invited talk at the “Séminaire de Théorie des Nombres de Nancy-Metz” Nancy, IECL – 2019
- Invited talk at the “3rd Number Theory Meeting”, Università di Torino – 2018
- Invited talk at the “Aix-Marseille Number theory Seminar”, Marseille – 2018
- Invited talk at the “Québec-Vermont Number Theory Seminar”, Montréal – 2018
- Invited talk at the “2nd Number Theory Meeting”, Politecnico di Torino – 2017
- Contributed talk at the “Number Theory Week 2017”, University of Poznań – 2017
- Invited talk at “Rencontre de théorie analytique et élémentaire des nombres”, Institut Henri Poincaré, Paris – 2017
- Invited talk at the workshop “Painlevé equations and their applications”, American Institute of Mathematics – 2017
- Algebraic Geometry and Number Theory Seminar, École polytechnique fédérale de Lausanne – 2017
- Invited talk at the workshop “Moments of zeta and correlations of divisor sums”, American Institute of Mathematics – 2016
- Invited talk at the Analytic Number Theory Seminar, University of Montréal – 2016
- Invited talk at the Number Theory Seminar, Dartmouth College – 2016
- Invited talk at the Number Theory Seminar, Università degli Studi di Milano – 2016
- Invited talk at 2015 CMS Winter Meeting, Montréal – 2015
- Peer to Peer Seminar, ICERM – 2015
- Invited talk at the Stanford Number Theory Seminar, Stanford University – 2015
- Invited talk at the Québec-Vermont Number Theory seminar, Montréal – 2014
- Invited talk at the Ohio State University seminar, Columbus – 2014
- Invited talk at the “Québec-Maine Number Theory Conference”, Université Laval – 2014
- Contributed talk at CNTA, Ottawa – 2014
- Invited talk at the 2013 CMS Winter Meeting, Ottawa – 2013
- Analytic Number Theory Seminar, University of Montréal – 2013
- Invited talk at the University of Genova – 2013
- Invited talk at the Québec-Vermont Number Theory seminar, Montréal – 2013
- Contributed talk at the Number Theory Satellite Session of the CMS meeting, Montréal – 2012
- Invited talk at the “Québec-Maine Number Theory Conference”, Université Laval – 2012
- Invited talk at the AMS Meeting “Special Session on Analytic Number Theory”, Rochester Institute of Technology – 2012

- Contributed talk at CNTA, Lethbridge – 2012
- Invited talk at the Linfoot seminar, University of Bristol – 2012
- Mingle 2011, University of Bristol – 2011
- MSRI, Berkeley, Graduate seminar – 2011
- Bristol Junior Number Theory Seminar – 2011
- Mingle 2009, University of Bristol – 2009

### CONFERENCES ORGANIZED

- Organizer of the “*Symposium on Analytic Number Theory*” a 5 days conference with 27 international invited speakers (Cetraro, July 2019) and about 120 participants. The budget is of about € 45 000 with funding from Foundation Compositio Mathematica, Indam, Indam Gnampa, Politecnico di Torino, University of Genova.
- Organizer of the Number Theory session at the *UMI-SIMAI-PTM meeting*, with 16 invited speakers (Wrocław, September 2018).
- Organizer of “*Giornate INDAM di Teoria dei Numeri*”, a 2 days conference in Number Theory with 14 invited speakers (Genova, December 2017).
- Organizer of *Young Researchers in Maths (YRM) 2012*, a conference that brought to Bristol about two hundred graduate students and postdocs, with 13 international keynote speakers and several contributed talks.

### THEMATIC PROGRAMS AND LONG VISITS ( $\geq 1$ month)

- Member in the program “Number Theory” at Institut Mittag-Leffler, Brown University, Winter 2020/2021 (upcoming).
- Visiting professor at Aix-Marseille Université, 1 month in April-May 2018
- Member in the “Computational Aspects of L-functions” at ICERM, Brown University, Fall 2015/2016.
- Member in the special year: “From arithmetic statistics to zeta elements” at the Université de Montréal, academic year 2014/2015.
- Several visits at the CRM (Montréal), including two 2.5-months visits in 2017 and in 2018.
- Several visits at the American Institute of Mathematics (about 3.5 months in 5 visits during the period 2009-2015)
- Visitor during the Program in “*Arithmetic Statistics*” at MSRI, 1 April 2011 – 15 May 2011

### OTHER SCIENTIFIC ACTIVITIES

- I was responsible for the research visits of Sary Drappeau (Aix-Marseille Université, 3 weeks in October-November 2018) and of Dimitris Koukoulopoulos (Université de Montréal, 1 month in June-July 2019), both funded by Indam.
- Refereed the PhD thesis of Mattia Cafferata (University of Parma 2018)
- Refereed and/or quick opinion for several journals including: *Duke*, *Journal of the EMS*, *Journal für die Reine und Angewandte Mathematik*, *Annales scientifiques de l'École normale supérieure*, *Publications mathématiques de l'IHÉS*, *Advances in Mathematics*, *Proceedings of the LMS*, *Bulletin of the LMS*, *Proceedings of the American Mathematical Society*, *Algebra and Number Theory*, *Nagoya Mathematical Journal*, *Monatshefte für Mathematik*, *Journal of Physics A: Mathematical and Theoretical*, *Canadian Mathematical Bulletin*, *The Ramanujan Journal*, *Acta Arithmetica*, *Journal of Number Theory*, *International Journal of Number Theory*, *Research in Number Theory*, *Journal of Mathematical Analysis and Applications*, *Publicationes Mathematicae Debrecen*, *Functiones et Approximatio, Commentarii Mathematici*,
- Reviewer for MathSciNet.
- I organized the *Peer to Peer Seminar* at ICERM (Fall 2015)
- I organized the *Analytic Number Theory Seminar* at the Université de Montréal (2013 – 2014).
- I started and organized the *Junior Number Theory Seminar* at the University of Bristol (2010 – 2011).

## TEACHING EXPERIENCE

- At the University of Genova, I taught the following courses:  
2019/2020: Matematica 2, Analisi 1  
2018/2019: Analisi 1, Calcolo Differenziale e Integrale 2, Teoria dei Numeri 1  
2017/2018: Calcolo Differenziale e Integrale 2, Analisi 1.  
2016/2017: Teoria dei numeri 1, Teoria analitica dei numeri (Master & PhD course).  
2015/2016: Analisi complessa, Istituzioni di Matematiche, Analisi 1, Number Theory (PhD course).
- In January-May 2015 I taught a Section of the course MATH 208 (Fundamental Mathematics I) at Concordia University.
- In January-May 2013 and in January-May 2014, I taught three Sections (in total) of the course MATH 209 (Calculus for Business, Economics, Life Sciences, and Social Science) at Concordia University.
- At the University of Bristol I was an Applied (2008-2009) and Pure (2010-2012) Tutor for a few groups of students, giving tutorial lectures in Linear algebra and geometry, Calculus, Analysis, Further Topics in Analysis, Mechanics, Number theory and Group theory. I marked students' homework for the courses Group theory, Calculus 2 and Algebraic Number Theory and for the courses where I was a tutor.

## COMMITTEES

- Member of the “Commissione didattica dei corsi di studi in Matematica e SMID” of the University of Genova (2019 – )
- Member of the “Collegio di Dottorato” of the Math Department of the University of Genova (2019 – )
- Member of the “Commissione giudicatrice per il concorso di dottorato” of the Math Department of the University of Genova (2019 – )
- Member of the “Commissione inglese” of the Math Department of the University of Genova (2018–19)