

Research Interests

Algebraic combinatorics, representation theory and probabilistic models, and their applications to analytic number theory, sometimes via random matrix theory.

Employment

- **ETH Zürich:** Heinz Hopf Lecturer, 2008–present.
- **Merton College, Oxford:** Junior Research Fellow, 2006–2008.
- **Institut des Hautes Etudes Scientifiques:** Visitor, April–May 2007.
- **Stanford University:** Graduate student, 2001–2006.
- **Université Libre de Bruxelles:** Teaching assistant, 1999–2001.

Education

- **Stanford University,** Ph.D. in Mathematics, under Prof. D. Bump. Thesis (2006): *Averages over compact Lie groups, twisted by Weyl characters and application to moments of derivatives of characteristic polynomials.*
- **Université Libre de Bruxelles,** Licence en Mathématiques, *summa cum laude* (2001).

Grants, Fellowships & Prizes

- **University of York** research grant, 2010.
- **Pólya Teaching Prize,** Stanford University, 2006.
- **Médaille de l'Université,** Université Libre de Bruxelles, 2002.
- **Belgian American Educational Foundation,** Honorary Fellow, 2001–2002.
- **Undergraduate Research Fellowship in Operational Research,** ISRO, Université Libre de Bruxelles, 1999.

Publications

- Combinatorics of lower order terms in the moments conjecture for the Riemann zeta function, in preparation.
 - On k -Plancherel averages, with Y. Barhoumi, in preparation.
 - Plancherel averages of rational functions of contents of partitions, in preparation.
 - *Integrality of hook ratios*, arXiv:1111.5959, submitted for publication.
 - *Golden ratio sequences for low-discrepancy sampling*, with C. Schretter and L. Kobbelt, submitted for publication.
1. *A multiset hook length formula and some applications*, with G. Han, in *Discrete Mathematics*, (311) 23–24, pp. 2690–2702, 2011.
 2. *On averages of randomized class functions on the symmetric groups and their asymptotics*, with D. Zeindler, to appear in *Ann. Inst. Fourier (Grenoble)*.
 3. *On an identity due to Bump and Diaconis, and Tracy and Widom*, in *Canadian Math. Bulletin* **54** (2011) no. 2, 255–269.
 4. *A note on moments of derivatives of characteristic polynomials*, in *DMTCS Proc. Formal Power Series and Algebraic Combinatorics 2010*, vol. 12.
 5. *Joint moments of derivatives of characteristic polynomials*, in *Algebra and Number Theory Journal* **2** (2008), no. 1, pp. 31–68.
 6. *Averages over classical Lie groups, twisted by characters*, in *J. Combin. Theory Ser. A* **114** (2007), no. 7, pp. 1278–1292.
 7. *Autologlyphs*, with H. Segerman, in *Math. Intell.* **26** (2004), no. 2, cover art and pp. 37–39.

8. *One hundred prisoners and a light bulb*, with D. Ford and H. Segerman, in *Math. Intell.* **25** (2003), no. 4, pp. 53–61.
9. *RWPri and $(2T)_1$ flag-transitive linear spaces*, with F. Buekenhout and D. Leemans, in *Beiträge Algebra Geom.* **44** (2003), no. 1, pp. 25–46.
10. *On the structure of the group of multiplicative arithmetical functions*, in *Bull. Belg. Math. Soc. Simon Stevin* **9** (2002), no. 1, pp. 15–21.

Seminars & Talks

1. *Combinatorics of the moment conjecture for the Riemann zeta function*, ETH, September 2011.
2. *Modèles de matrices aléatoires via les partitions asymptotiques*, Université Libre de Bruxelles, January 2011.
3. *Asymptotic integer partitions and random matrix theory*, ETH Zürich and University of Bristol, March 2010, and FPSAC, San Francisco State University, poster (August 2010).
4. *What we (don't) know about primes*, ETH Zürich Open Days, September 2009.
5. *Fonctions de Schur et matrices aléatoires*, Institut H. Poincaré, June 2009.
6. *Calculs sur les matrices aléatoires et conjecture des moments en théorie des nombres*, Colloquium, U. de Neuchâtel, April 2009.
7. *Primes, partitions and permutations*, ETH Zürich, October 2008.
8. *Introduction to Random Matrix Theory for Analytic Number Theory*, Rencontres Géométrie non commutative, Aspet, July 2008.
9. *Something strange is going on with the prime numbers*, Merton College, June 2008.
10. *New approaches to Random Matrix Theory problems motivated by Number Theory*, ETH Zürich, January 2008.
11. Various stages of *Moments of derivatives of characteristic polynomials*,
 - UCLA & UCSB Number Theory seminars, March 2008.
 - Random matrices and number theory workshop, Hausdorff Research Institute, Bonn, January 2008.
 - ETH Zürich Stochastic Analysis seminar, October 2007.
 - Heilbronn Conference on Number Theory and Random Phenomena, Bristol, March 2007.
 - Heilbronn Seminar Series, Bristol, October 2006.
12. *100 prisoners and a light bulb: a cruel introduction to complexity theory*, Enrichment Program for Gifted Youth invited talk, August 2007.
13. *Averages over compact Lie groups (and applications to Number Theory predictions)*, Oxford Number Theory Seminar, January 2007.
14. *An introduction to SLE*, Stochastic Analysis students seminar, Oxford, November 2006.
15. *Averages over compact Lie groups, twisted by Weyl characters*,
 - Thesis defense talk, Stanford, August 2006.
 - Number Theory and Random Matrix Theory Conference, Rochester, June 2006.

16. *Intégrales sur des groupes de Lie classiques: une introduction à la théorie des matrices aléatoires*, Special seminar, Brussels, March 2005.
 17. *Deformations of Galois representations*, Representation Theory seminar, Stanford, October 2004.
 18. *The Periods of Kontsevich and Zagier*, Graduate students seminar, Stanford, May 2004.
 19. *Half-integral weight forms in Gross' work*, Gross-Zagier reading seminar, Stanford, May 2004.
 20. *Algebraicity of critical values of L-functions according to Shimura, parts I & II*, Number theory students and post-docs seminar, Stanford, April 2004.
 21. *Primes in P*, Graduate students seminar, Stanford, March 2003.
 22. *Proof from the Book: Can an uncountable family of holomorphic functions hit countably many values at all points?*, Graduate students seminar, March 2002.
 23. *Théorie des Jeux*, Special seminar, Brussels, October 2000,
- and additional informal talks in research or student seminars.

Teaching

Courses

- ETH Zürich, as lecturer: *Introduction to polytopes*, *Analytic Theory of L-functions*, *Introduction to Analytic Number Theory*, *Enumeration Techniques and Hypergeometric Summation*, *Representation Theory of Finite Groups* and *Topics in Number Theory*;
- Oxford, as class tutor: *Lie groups*;
- Stanford-in-Oxford program, as class tutor: *Number theory*;
- Stanford, as course/teaching assistant: numerous service courses;
- Université Libre de Bruxelles, as teaching assistant: *Linear algebra and basic group theory*.

Student advising/committees

- *Shnirel'man density and Waring's conjecture* (Elena Widmer, ETH B.Sc. thesis)
- *The LLL-algorithm and some applications* (Karin Peter, ETH B.Sc. thesis)
- *An introduction to Szemerédi's theorem* (Benjamin Berni, ETH B.Sc. thesis)
- *Associated class functions and characteristic polynomials on the symmetric group* (Dirk Zeindler, U. Zürich Ph.D. thesis committee and joint paper)
- *Integral Moments of elliptic curve L-functions over \mathbb{Q} and The Hawkins random sieve* (Meriton Ibraimi, ETH M.Sc. thesis and Bachelor arbeit)
- *Gram's law fails a positive proportion of the time* (Timothy Trudgian, Oxford Ph.D. transfer thesis committee)
- *Selberg's central limit theorem* (Patrick Kühn, ETH M.Sc. thesis)
- *Soundararajan's bound for moments of the zeta function* (Troy Koltes, ETH B.Sc. thesis)
- *Integrality of factorial ratios of height greater than 1* (Nicolas Wider, ETH M.Sc. thesis)

Others

- Pólya Teaching Prize, Stanford University, 2006.

- Putnam competition seminar mentor (Stanford , 2004–2006).
- Graduate seminar co-organizer (Stanford , 2002–2003).

Personal

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Programming skills: Python, C++, Magma, Mathematica, Sage (contributor).

References

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Teaching

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