

HARALD ANDRÉS HELFGOTT - List of Publications

Pure mathematics

35. Summing $\mu(n)$: a faster elementary algorithm (with L. THOMPSON), in preparation.
34. Explicit L^2 bounds for the Riemann ζ function (with D. DONA and S. ZÚÑIGA ALTERMAN), submitted.
33. *The ternary Goldbach problem*, to appear in *Ann. of Math. Studies*. This book (currently 554pp.+xv) should replace articles 21, 25 and 26 below.
32. An improved sieve of Eratosthenes, *Math. Comp.* **89** (2020), no. 321, 333–350.
31. Growth in linear algebraic groups and permutation groups: towards a unified perspective, in: *Groups St Andrews 2017 in Birmingham. Selected papers of the conference, Birmingham, UK, August 5–13, 2017*, Cambridge University Press, 2019.
30. *Isomorphismes de graphes en temps quasi-polynomial (d’après Babai et Luks, Weisfeiler-Leman,...)* (mainly expository), *Astérisque* **407** (2019), Séminaire Bourbaki 2016/2017, 135–182. A translation (*Graph isomorphisms in quasi-polynomial time*) by J. Bajpai and D. Dona (with solutions and some supplementary exercises) is available at <https://arxiv.org/abs/1710.04574>.
29. Soficity, short cycles and the Higman group (with K. JUSCHENKO), *Trans. Am. Math. Soc.*, **371.4** (2019): 2771–2795.
28. On the dimension of additive sets (with P. CANDELA), *Acta Arith.* **167** (2015), 91–100.
27. Random generators of the symmetric group: diameter, mixing time and spectral gap (with Á. SERESS et A. ZUK), *J. of Algebra* **421** (2015), 349–368.
26. The ternary Goldbach conjecture is true, available at <https://arxiv.org/abs/1312.7748>.
25. Major arcs for Goldbach’s problem, available at <https://arxiv.org/abs/1305.2897>.
24. Numerical verification of the ternary Goldbach conjecture up to $8.875e30$ (with D. PLATT), *Experiment. Math.* **22** (2013), no. 4, 406–409.
23. Growth in groups: ideas and perspectives, *Bull. Am. Math. Soc.* **52** (2015), no. 3, 357–413.
22. On growth in an abstract plane (with N. GILL and M. RUDNEV), *Proc. Amer. Math. Soc.* **143** (2015), no. 8, 3593–3602.
21. Minor arcs for Goldbach’s problem, <https://arxiv.org/abs/1205.5252>.
20. Bounds on the diameter of Cayley graphs of the symmetric group (with J. BAMBERG, N. GILL, T. HAYES, Á. SERESS, P. SPIGA), *J. Algebraic. Combin.* **40** (2014), no. 1, 1–22.
19. Square-free values of $f(p)$, f cubic, *Acta Math.* **213** (2014), no. 1, 107–135.
- Th3. Groupes, courbes et croissance, habilitation thesis, Paris-Sud (Orsay).
18. On the diameter of permutation groups (with Á. SERESS), *Annals of Math.* **179** (2014), no. 2, 611–658.
17. Deterministic methods to find primes (as *D. H. J. Polymath*, with T. TAO et E. CROOT), *Math. Comp.* **81** (2012), no. 278, 1233–1246.
16. Growth in solvable subgroups of $GL_r(\mathbb{Z}/p\mathbb{Z})$ (with N. GILL), *Math. Annalen* **360** (2014), no. 1–2, 157–208.
15. Growth of small generating sets in $SL_n(\mathbb{Z}/p\mathbb{Z})$ (with N. GILL), *Int. Math. Res. Notices*, Vol. 2011, 4226–4251.
14. An explicit incidence theorem in \mathbb{F}_p (with M. RUDNEV), *Mathematika*, 57 (2011), no. 1, 135–145.
13. Improving Roth’s theorem in the primes (with A. DE ROTON), *Int. Math. Res. Notices*, Vol. 2011, 767–783.
12. Growth in $SL_3(\mathbb{Z}/p\mathbb{Z})$, *J. Eur. Math. Soc. (JEMS)*, vol. 13, no. 3, pp. 761–851.
11. Power-free values, repulsion between points, different beliefs and the existence of error, *Anatomy of Integers*¹, 81–88, Amer. Math. Soc., Providence, RI, 2008.
10. How small must ill-distributed sets be? A two-dimensional large sieve (with A. VENKATESH),

¹Conference proceedings.

Analytic number theory: essays in honor of Klaus Roth, 224–234, Cambridge U. Press, 2009.

9. Growth and generation in $SL_2(\mathbb{Z}/p\mathbb{Z})$, *Annals of Math.* **167** (2008), no. 2, 601–623.

8. Power-free values, large deviations and integer points on irrational curves, *J. Théor. Nombres Bordeaux* **19** (2007), 433–472.

7. The parity problem for irreducible polynomials, 11 pp., <https://arxiv.org/abs/math/0501177>.

6. The parity problem for reducible polynomials, *J. London Math. Soc. (2)* **73** (2006), no. 2, 415–435.

5. Integral points on elliptic curves and 3-torsion in class groups (with A. VENKATESH), *J. Amer. Math. Soc.* **19** (2006), no. 3, 527–550.

4. Root numbers and ranks over global function fields (with B. CONRAD and K. CONRAD), *Adv. Math.* **198** (2005), 684–731.

3. On the square-free sieve, *Acta Arith.* **115** (2004), 349–402.

2. On the behaviour of root numbers in families of elliptic curves, 65 pp., <https://arxiv.org/abs/math/0408141>.

Th2. *Root numbers and the parity problem*, PhD thesis, Princeton University, May 2003.

1. Enumeration of tilings of diamonds and hexagons with defects (with I. M. GESSEL), *Electron. J. Combin.* **6** (1999), no. 1, R16, 26 pp.

Th1. *Edge effects on local statistics in lattice dimers*, B.A. thesis, Brandeis University, May 1998.

Pure mathematics – popularization and exposition

Note: while PE2–PE4 are not identical, they have a considerable intersection.

PE7. Primos, paridad y análisis (with A. UBIS), to appear in *Actas de la escuela AGRA III*.

PE6. Growth and expansion in algebraic groups over finite fields, to appear in the proceedings of the Arizona Winter School 2016.

PE5. Crecimiento y expansión en SL_2 , to appear in *Actas de la escuela AGRA II: Aritmética, grupos y análisis*, Publications of IMPA.

PE4. The ternary Goldbach problem, *Proceedings of the International Congress of Mathematicians – Seoul 2014*, Vol. II, 391–418, Kyung Moon Sa, Seoul, 2014.

PE3. La conjetura de Goldbach ternaire. Translated by M. Bilu, revised by the author. *Gaz. Math.* no. 140 (2014), 5–18.

PE2. La conjetura débil de Goldbach, *Gac. R. Soc. Mat. Esp.* **16** (2013), no. 4.

PE1. *Azar y aritmética*, *Monografías del Instituto de Matemática y Ciencias Afines*, 50. Instituto de Matemáticas y Ciencias Afines (IMCA), Lima, Peru, 2010.

Pedagogy and history

PH3. A modern vision of the work of Cardano and Ferrari on quartics, (with M. HELFGOTT) *CONVERGENCE, an online journal of the Mathematical Association of America*, July 2009.

PH2. A noncalculus proof that Fermat’s principle of least time implies the law of refraction (with M. HELFGOTT), *Am. J. Phys.* **70** (2002), no. 12, 1224–1225.

PH1. Maxima and minima before Calculus (with M. HELFGOTT), *Pro Mathematica XII* (1998), nos. 23–24, 135–158.

Computer Science

Note: I am no longer active in this field. My work in algorithmic number theory can be found under the heading of “pure mathematics” above.

I3. Lossless image compression by block matching (with J. A. STORER), *Comput. J.* **40** (1997), no. 2/3, 137–145.

I2. Asymmetry in Ziv/Lempel ’78 Parsing (with M. COHN), 320–328, in: *Compression and complexity of sequences: proceedings, 1997*, IEEE, Los Alamitos, CA, IEEE Computer Society Press, 1997.

I1. On Maximal Parsings of Strings (with M. COHN), 291–299, in: *Proceedings DCC ’1997: Data Compression Conference*, IEEE, Los Alamitos, CA, 1997.