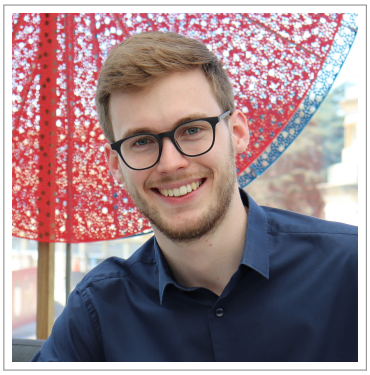

Cédric Pilatte

Curriculum Vitae

St Giles'
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University of Oxford (UK)

Education

DPhil (PhD), *University of Oxford*, Advisors: Ben Green, James Maynard. **2022–****
Research areas: Additive Combinatorics and Analytic Number Theory.

MSc. Mathematics, *École Normale Supérieure (ENS Ulm)*, Paris. **2019–2022**
Three-year research-oriented graduate degree. Admitted as one of the ten laureates (all disciplines combined) of the International Selection in Sciences.
Average grades: 19.11/20 in first year, 19.02/20 in second year (including research project with Tim Gowers (Fields medalist 1998)) and 19/20 for my last year's Master's Thesis with James Maynard (Fields medalist 2022).

BSc. Mathematics, *University of Mons*, Belgium. **2016–2019**
La plus grande distinction (summa cum laude). Computer science as minor subject.
Average grades by year: 18.82/20, 18.98/20 and 19.58/20. Received the prizes *Prix de la Faculté des Sciences* in 2017 and *Prix de Département de Mathématiques* in 2019.

Secondary Education, *Collège Sainte Gertrude*, Nivelles, Belgium. **2010–2016**
I was selected to participate in the Olympiad training camps each year in the period 2013-2016.

Publications

Research

Unconditional correctness of recent quantum algorithms for factoring and computing discrete logarithms, *Preprint: arxiv.org/abs/2404.16450*. **2024**
Proof of Regev's number-theoretic conjecture underlying his improvement on Shor's algorithm.

Improved bounds for the two-point logarithmic Chowla conjecture, *Preprint: arxiv.org/abs/2310.19357 (75 pages)*. **2023**
Exponential improvement of bounds on correlations of multiplicative functions.

A solution to the Erdős-Sárközy-Sós problem on asymptotic Sidon bases of order 3, *Preprint: arxiv.org/abs/2303.09659, Accepted in Compositio Mathematica*. **2023**
Settled a 1993 conjecture of Erdős on the existence of a Sidon set S such that $3S$ is cofinite.

New bound for Roth's theorem with generalized coefficients, *Discrete Analysis, (2022), 16*. **2021**
Proof of a conjecture of Shkredov and Solymosi, obtained by generalising the Bloom-Sisask bound to three-variable equations with matrix coefficients in arbitrary dimension.

A note on optimal degree-three spanners of the square lattice, *Discrete Mathematics, Algorithms and Applications, (2021), 2150124*. **2020**
Computer-assisted disproof of a conjecture in discrete geometry (with D. Galant).

NP-completeness of slope-constrained drawing of complete graphs, *Journal of Computational Geometry, Vol 11(1) (2020), 371-396*. **2020**

On the sets of n points forming $n+1$ directions, *Electronic Journal of Combinatorics, Vol 27(1) (2020), P1.24*. **2019**
Proof of a 1986 inverse conjecture of Jamison in combinatorial geometry.

Expository

Helfgott and Radziwiłł's work on Chowla's conjecture, *Master's Thesis.* **2022**

Un problème de pentes, *Losanges, N° 44, p20-26.* **2019**

Media

My research was featured in: Quanta Magazine (link), Science & Vie (link), Sueddeutsche Zeitung (link), Royal Dutch Mathematical Society (link). **2023**

Scholarships and Prizes

Graduate Research Fellowship, *Jane Street.* **Feb 2024**

Saven Scholarship, *University of Oxford.* **Jun 2022**

Mathematical Institute Scholarship, *University of Oxford.* **May 2022**

Initiation to Research Scholarship, *University of Mons.* **Jul-Aug 2019**

International Selection Scholarship, *École Normale Supérieure (ENS).* **Feb 2019**

Sophie Germain Master Scholarship, *Fondation Mathématique Jacques Hadamard*, I declined the scholarship in favor of the ENS. **Feb 2019**

Experience

Structure and randomness (conference in honour of Timothy Gowers), *Isaac Newton Institute, Cambridge.* **Apr 2024**

Analytic number theory and its interfaces (conference in honour of Roger Heath-Brown), *University of Oxford.* **Jul 2023**

Random matrices: from quantum chaos to the Riemann zeta function (conference in honour of Jon Keating), *Bristol.* **Jul 2023**

Invited Visitor at the Institute for Advanced Study, *Princeton.* **Sep 2022**

A celebration of analytic number theory (conference in honour of Andrew Granville), *University of Montréal.* **Sep 2022**

Summer school in analytic number theory, *IMJ-PRG, Paris.* **Jun-Jul 2021**

Research internship with Timothy Gowers, *Collège de France.* **Feb-Jun 2021**
Study with Tim Gowers of the 2020 breakthrough paper by Bloom and Sisask on Roth's theorem, which led me to prove a multidimensional generalization of the same quantitative strength.

Heidelberg Laureate Forum, *(Online).* **Sep 2020, Sep 2021**
The HLF is a week-long conference where 200 selected young researchers in Mathematics and Computer Science interact with recipients of the most prestigious awards such as the Abel Prize, the Fields Medal and the Turing Award.

PROMYS Europe (Counsellor), *University of Oxford*, Programme in Mathematics for Young Scientists. **Jul-Aug 2018**
After a successful application, I worked as one of the eight Counsellors for this six-week European programme. As part of the role, I gave daily feedback on the work of three talented participants, on topics ranging from Abstract Algebra to Number Theory, while studying Dwork's proof of the rationality of zeta functions via p-adic Analysis at the Counsellor seminar.

Modern Mathematics Summer School, *Jacobs University*, Bremen. **Jul 2017**
This intensive two-week programme gives the internationally selected participants the opportunity to attend countless lectures and discuss with leading mathematicians from all around the world.

PROMYS Europe (Participant), *University of Oxford.* **Jul-Aug 2016**
A challenging six-week programme with daily lectures in Number Theory, designed for the participants to discover deep mathematics in a collaborative environment. About 20 students are selected, from all over Europe.

Referee

Annals of Mathematics.

Journal of the American Mathematical Society.

International Mathematics Research Notices.

Discrete Analysis.

Discrete & Computational Geometry.

Talks

Conferences and seminars (invited speaker)

Improved bounds for Chowla's conjecture with logarithmic weights, *UCL Combinatorics Seminar, London*. **Apr 2024**

Factoring integers with quantum computers, *Graduate Research Fellowship Workshop, Jane Street, New York*. **Apr 2024**

Stronger bounds for logarithmic correlations of multiplicative functions, *Bordeaux Number Theory Seminar*. **Mar 2024**

Improved bounds for the logarithmic Chowla problem, *RTAEN Meeting, Institut Henri Poincaré, Paris*. **Mar 2024**

Quantitative bounds for a weighted version of Chowla's conjecture, *Oxford Junior Number Theory Seminar*. **Jan 2024**

Recent progress on binary correlations of the Liouville function, *Shandong University Number Theory Seminar*. **Jan 2024**

Graph eigenvalues and the logarithmic Chowla conjecture in degree 2, *Warwick Junior Number Theory Seminar*. **Jan 2024**

Improved bounds for two-point correlations of the Liouville function, *WOMBL Meeting, University of Cambridge*. **Jan 2024**

A combinatorics problem of Erdős solved with function field number theory, *Bristol Combinatorics Seminar*. **Oct 2023**

An application of number theory over function fields to combinatorics, *Conference for Young Number Theorists in Bonn*. **Sep 2023**

An Erdős problem on additive Sidon bases: perverse sheaves in action, *Stanford Analytic Number Theory Student Seminar*. **May 2023**

Combinatorics goes perverse: an Erdős problem on additive Sidon bases, *Oxford Junior Number Theory Seminar*. **May 2023**

The inverse slope problem and additive combinatorics, *Mathematics Seminar, ENS Paris*. **Apr 2020**

Stretch factor of convex curves, *Math and Computer Science Junior Seminar, University of Mons*. **Oct 2019**

The minimum dilation problem, *YMSGR Symposium, University of Liège*. **Sep 2019**

Talks on research by others

Convolutions of integer sets: a galaxy of (mostly) open problems, *Oxford Mathematical Institute, North meets South Colloquium*. **Jan 2024**

Quantitative equidistribution of the prime counting function in residue classes, *Oxford Analytic Number Theory Reading Seminar*. **Oct 2023**

A diophantine inequality of Robert and Sargos, *Oxford Analytic Number Theory Reading Seminar*. **May 2023**

The fascinating world of prime numbers: an insight into the work of James Maynard, *Palace of the Academies (Brussels)*. **Mar 2023**
Invited by the Belgian Mathematical Society to present the work of James Maynard at the "Recent Breakthroughs in Mathematics" Symposium.

The logarithmic Chowla conjecture, *RTAEN Meeting, Institut Henri Poincaré, Paris*. **Dec 2022**

Analytic number theory: the additive perspective, *ENS Paris*. **Jun 2022**

On the largest subsets of $\{1, 2, \ldots, n\}$ without arithmetic progressions of length 3, *Algebra and Logic Seminar, University of Mons*. **May 2021**

The de Rham-Witt Complex (with Luc Illusie), *Banyuls, France*. **Nov 2019**

Primes everywhere, *Math Department Seminar, University of Mons*. **Jun 2019**

Addi(c)tive combinatorics, *Model Theory Seminar, University of Mons*. **Jun 2019**

Poster

The Inverse Slope Problem and Additive Combinatorics, *British Mathematical Colloquium, Glasgow (Online)*. **Apr 2021**

Outreach

Fibonacci Math Programme, *Balliol College, Oxford*. **Feb-Mar 2024**
I ran online sessions for disadvantaged high school students in number theory and combinatorics.

The distribution of prime numbers, *King's High School, Warwick, UK*. **Feb 2024**
I explained and motivated the analytic study of prime numbers for the school's Math Society.

An excursion in additive combinatorics, *Tonbridge School, UK*. **Oct 2023**
I had an informal chat with high-school students and gave an accessible talk on my research.

The fascinating world of prime numbers, *ENS, Paris*. **May 2023**
Invited to speak about James Maynard's work at the Journées ENS-CPGE.

The game of Set and the polynomial method, *ENS, Paris*. **May 2022**
With 50 high-school students, using the game of Set as an invitation to modern mathematics.

The cap cet problem, *University of Oxford*. **Aug 2019**
Guest speaker for the PROMYS Europe programme.

The cap set problem and the polynomial method, *University of Mons*. **Jul 2019**
Two-day activity introducing high school and university students to research-level mathematics.

Olympiad training, Wépion, Belgium. **2017-now**
I give courses in number theory for the future Olympiad contestants.

Contests

Individual

French Federation of Mathematical Games (FFJM), Belgium, 1st place. **2017**

International Mathematical Olympiad (IMO), Hong-Kong. **2016**
Selected in the Belgian team, but participated to PROMYS Europe instead.

Benelux Mathematical Olympiad, Soest, Netherlands. **2016**

Belgian Mathematical Olympiad, 1st prize in 2016. **2012–2016**

Team

Northwestern Europe Regional Contest (NWERC), Eindhoven, Netherlands, 32nd out of 130 teams from 11 countries. **2018**

Battle Dev, Online French Algorithm Competition, 1st and 2nd resp. **2017, 2019**

Benelux Algorithm Programming Contest (BAPC), Amsterdam and Louvain-la-Neuve, 3rd in 2018. **2017, 2018**

Watson Hackathon, *Artificial Intelligence*, IBM Brussels. **2017**

Languages

French (native)**, English** (highly proficient)**, Dutch** (good command).